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...UTAH...

A Complete and Comprehensive Description

OF THE

Agricultural and Mineral Resources, Stock Raising and Manufacturing Interests

Its Attractions, Institutions, Etc.

WITH STATISTICS IN REGARD TO ITS

Climate, Population, Industries, Finances, Etc.

Compiled from the Latest Reports.

Compliments of the ...

PASSENGER DEPARTMENT.

TENTH EDITION.

March 1901.

UNION PACIFIC RAILROAD AND CONNECTIONS.

Union Pacific Railroad Company.

UTAH

ITS

RESOURCES and ATTRACTIONS

1901

COMPLIMENTS OF THE

PASSENGER DEPARTMENT

TENTH EDITION

Omaha, Neb. 1901

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A

COMPLETE AND COMPREHENSIVE

REVIEW OF THE MINERAL AND AGRICULTURAL

RESOURCES, THE STOCK GROWING AND MANUFACTURING

INTERESTS, THE SCENIC AND CLIMATIC ATTRACTIONS, THE FAMOUS HEALTH,

BATHING, AND PLEASURE RESORTS, AND THE COMMERCIAL,

INDUSTRIAL, FINANCIAL, SOCIAL, EDUCATIONAL,

AND RELIGIOUS ADVANTAGES

OF THE

STATE OF UTAH

WITH TABLES

OF TEMPERATURE AND PRO-

DUCTION, STATISTICS OF POPULATION AND

WEALTH, THE ANNUAL OUTPUT OF MINES, RANGES, AND FARMS,

TOGETHER WITH MUCH GENERAL INFORMATION AND MANY HERETOFORE UN-

PUBLISHED FACTS ABOUT THE NEW STATE WHICH WILL BE OF

INTEREST TO TOURISTS, CAPITALISTS, HOMESEEKERS,

AND OTHERS, COMPILED FROM THE

LATEST REPORTS.

TENTH EDITION.

In compiling the book, the pages of current Utah publications have been frequently drawn upon, and much that other writers have said about the State has been used entire or with such changes as were needed to make their statements applicable to present conditions. Copious extracts have also been taken from special editions of the Salt Lake *Tribune*, *Herald*, and *Deseret Evening News;* from the "Resources and Attractions of Utah," a publication prepared by Mr. H. L. A. Culmer, of Salt Lake City, for the Salt Lake Chamber of Commerce; from the official report of Prof. Marcus E. Jones, an United States Treasury expert; from files of statistics collected by the State, and from Union Pacific publications, and numerous other pamphlets and special articles; and the Union Pacific is **specially indebted to Mr. E. F. Colborn, ex-Secretary of the Salt Lake Chamber of Commerce, for his invaluable assistance in this compilation.**

OMAHA, MARCH, 1901.

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INTRODUCTION.

TAYLOR COL. AUG. 1940

Because publications of this class frequently contain exaggerations, which mislead persons seeking conservative and reliable information, it does not follow that the statements in this book is untrustworthy. No advantage could be gained from either misrepresentation or exaggeration when the plain truth about Utah's resources, advantages, and attractions entitle her to a certificate of greatness, such as no other State in the West can claim.

Strangers to the real wonders of Utah often find it difficult to accept the most truthful descriptions of them. For instance, many people find it hard to believe that the human body will not sink in the Great Salt Lake, although that fact is demonstrated every day in the summer season at Garfield Beach. Ordinarily it is easy to tell the truth, but when the truth is stranger than fiction, it is sometimes difficult to tell it in a way to carry conviction.

The statistics and tables herein were made up from reliable authorities, and may be depended upon, and the hope is expressed that they will be of service to inquirers about Utah, and be the means of attracting immigration and capital to the State.

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UTAH.

The exodus of the followers of Joseph Smith (then but lately dead at the hands of the Carthage mob) from their city of Nauvoo, and their sorrowful pilgrimage to the Missouri River, is the preface to the interesting story of the first settlement of Utah. This was in 1846, and the weather was bitter cold. Crossing the Mississippi upon the ice, with only such property as in the haste of departure they could secure, they moved on to where Omaha now stands, and gave to the spot the name of Winter Quarters. Of that exodus history contains no perfect parallel, but it has been compared to the flight of the Pilgrim Fathers from England to the New World. They rested at Winter Quarters until the spring of 1847, when, on the 6th day of April, began the first journey of the first company to Utah. Behind them were all the comforts and pleasures of civilization; before them was an unknown and mysterious solitude, a land with slow-flowing streams, rushing torrents, massive mountain ranges, illimitabe prairies and dangerous deserts—the hunting grounds and battlefields of savage tribes. Into this they plunged—the 143 men, 3 women and 2 children—under the leadership of Brigham Young, with an abiding faith in the guiding hand of God. The story of that journey has been told in Utah for fifty years, and will be told as was told in Rome "how Horatius kept the bridge in the brave days of old." The little train of 121 wagons crept along day by day until the plains were crossed, the mountains were passed and the deserts were traversed, and until, on the 24th day of July, the immortal company reached its journey's end on the shores of the Great Salt Lake. Strange to say, not one perished by the wayside. Before the day of their arrival was done the foundations of the great empire of the West had been laid. From that beginning unfolded the present civilization of the trans-Missouri region. Over the trail made by the pioneer train soon followed other companies, and before the close of the year 1847 two thousand people were actively engaged in the reclamation of the Utah deserts.

Whatever may be said of the religious belief of the Mormon people, no one well informed will deny them the credit of having first broken the barriers of the Western wilderness. They first employed irrigation to water the deserts, and under their unselfish system of using the streams undoubtedly more lands were reclaimed than would have been reclaimed by people undisciplined by religious creed. Their achievements not only in agriculture, but in the general business of empire-building, are exemplified today all over the great State of Utah. The wonders they have accomplished within fifty years, when we consider their poverty and the odds with which they contended, might well have required double the time. Their pioneer train was the preliminary survey of the great Union Pacific Railroad; their manufactories were the first in the West to utilize home raw material; their soldiers subdued the savage tribes around them; their toilers built many of the wagon roads and railways that now carry the commerce of their State; they helped build the first telegraph line into the intermountain country, and within that country they built a system of their own whereby communication was made possible between all their settlements; their organized bands were sent to redeem the desert valleys, that are now the most productive portions of Arizona, Idaho, Nevada and Wyoming. To mining only did they seem indifferent, and perhaps to the so-called "Gentiles" is due the credit of having given to Utah that most valuable industry.

GENERAL HISTORY.

Prof. Marcus E. Jones, an United States Treasury expert, has this to say of the conditions and population of Utah prior to the first Mormon settlement:

"Its primitive inhabitants doubtless came into it by way of the natural highways formed by the great rivers—the Columbia on the north and the Colorado on the south—for Indians have small facilities for carrying water, and therefore could not have crossed the arid regions on the west. The Indians, like their white successors, built their wickiups along the streams where the waters broke from the mountains and flowed out on the more level valleys below. They had inhabited the land long enough to spread over all the territory that had water to supply them and their animals with drink. There was an abundance of the most nutritious grass over plains, mountains, and deserts; water alone was lacking on the latter. Game was everywhere abundant. The large rivers and streams were thickly bordered with Indian villages of the most primitive description, there being, even at the time of the white occupancy, no attempt at even barbaric civilization. The tribes were various and generally at war with each other. Some commerce was carried on with the Apache and Navajo Indians of the south, and some with the tribes of the tributaries of the Columbia River, but Utah's people were more or less cut off from the rest of the world by their peculiar surroundings—desert and mountain barriers—and only vague reports got to the ears of the outside world about its rivers and great salt sea.

"The restless spirit that pervaded the New World at and after its discovery led hundreds of fearless men to set out into the wilderness to explore its fastnesses. The number of these men increased year by year until, in less than a century, the borders of Utah were reached. It will always remain a mystery as to who saw Utah first, and what white man first beheld the green waters of Great Salt Lake, but it is sufficient to say that those who are credited with being the discoverers were not the first ones who traversed the land and saw the lake. The first who have left records of their travels were Spaniards. About 1540 Cardenas reached the banks of the Colorado River in what is now a part of Utah. In 1776 Father Escalante traveled down the Dolores River, crossed the Upper Colorado, probably followed near the Green River, and struck one of its tributaries, the Duchesne, following it up and crossing over to the Provo River and down to Utah Lake, but he never seems to have seen the great salt sea thirty miles farther north, though he heard some strange tales about it. Undoubtedly both before and after Escalante's time, many trappers and hunters traversed Utah and saw all its wonders, but the first records that we have say that in 1824-25 Capt. James Bridger, with several other men, came near the lake, and Bridger first saw and tasted its waters. In 1826 four trappers explored the lake. From that time forth many people visited Utah on their way to the Pacific Coast. In 1832 Bonneville came near, if he did not visit the lake. He published a map of the lake, and an attempt was made to name the lake after him, but it failed, justly. * * * * * * * * * * * *

"Gen. John C. Fremont visited the lake in 1843, and on his return published a very truthful and interesting account of it and the present settled portion of Utah. Brigham Young read this some time after it was published, and as his people were being hard pressed by those of the States, he decided to remove to a region out of their reach, where he could build up a theocracy according to his own ideas."

EARLY DEVELOPMENT.

Utah was settled by a systematic process and for the definite purpose of building up, far from the prejudiced East, a State after the model of Brigham

Young. It was intended to be the headquarters of the Mormon Church and the home place for the oldest as well as the newest converts to that faith.

As soon as the first settlers were certain of their ability to maintain themselves in their new home, they began systematically to induce immigration from among those of their religious belief. Emigration societies were organized, the Perpetual Emigration Fund was established, and missionaries were sent into every part of the civilized world. The work thus done produced early results, and a steady stream of Mormons poured into Utah.

To this systematic work the State is indebted for a great part of its present population, which by the census of 1900 is fixed at 276,749, a gain of 68,844, or 33 1-10 per cent. over the population of 1890. At the close of 1848 there had arrived in the Territory 2,090 people, 649 wagons, 164 horses, 2,468 oxen, 993 cows, 358 sheep, 37 hogs and 716 chickens, and the work of redeeming the desert was fairly under way. The Perpetual Emigration Fund was a strong factor in the settlement of the Territory. From this fund advances against their future earnings were made to those unable to bear the expense of the journey to Utah. Immigrants with some money paid it into the fund, and later, from their earnings, made good the difference between their credit and the cost of the journey.

The effect of the work of inducing immigration by these and other methods is well illustrated in the census reports of the United States, which show that less than three years after the arrival of the pioneers the Territory had a population of 11,380. This number had increased in 1860 to 40,273; in 1870, to 86,786; in 1880, to 143,963; in 1890, to 207,905, and in 1900 to 276,749. Prior to 1870 practically all of the immagrants were of the Mormon faith, but the mining interest, which began actively to develop that year, and which has continued unabated unto this day, and the development of railroad and other enterprises since 1870, are responsible for a considerable portion of the increase in population since that time.

The advantage of systematic over desultory methods is strikingly illustrated in the history of Utah's growh. The prophet Brigham Young, whatever else he was, was a wise and able leader. He was looked upon by his folowers as an Angel of Light, and was believed by them to be under divine guidance. He was especially equipped to command men and dictate measures, and, in the language of a well-known historian, was:

"A practical and far-seeing man, one who, by his will, ability and intuitive knowledge of human nature, was fitted to combat the difficulties that beset each step in his path of life, and to give cohesion to the heterogeneous elements of which his people were composed. * * * * * From the greatest details connected with the organization of this church (the Church of Jesus Christ of Latter Day Saints) down to the smallest minutiæ connected with the work, he has left upon it the impress of his great mind."

The prophet proceeded with deliberation and ability to bring about the speedy settlement of Utah. This he did, not only by sending missionaries throughout this and other lands in search of converts to his faith, but by continually enlarging the circle of settlement. Whenever a new band of converts arrived in Utah he located them upon desert lands, and charged them with the task of their reclamation. In this way the land was rapidly possessed, and settlement spread out farther and farther from the "Central Stake of Zion." The march of agricultural development is, perhaps, best told in the following language of Professor Jones:

"When all the good land was taken up around Salt Lake City, settlements sprung up along the base of the Wasatch Mountains, both north and south. In 1847 one place had been occupied some miles north of Salt Lake City. In 1848 the population streamed northward as far as forty miles, Farmington, Centerville, Bountiful and Ogden being settled, while the tide began to set in southward by the settlement of Mill Creek, some ten miles from the

city. The next year Brigham Young began his 'missions' by sending out a party to San Pete Valley, 100 miles south; to Tooele Valley, thirty miles west, and to Provo, in Utah Valley. In 1850 most of the immigrants swarmed into Utah Valley, thirty miles south of Salt Lake City, and founded Alpine, American Fork, Pleasant Grove and Springville. In 1851 the hamlets began to go northward from Ogden. Brigham Young still kept making new 'missions' by the founding of Parowan, Cedar and Paragonah, 150 miles south, along the western base of the Wasatch Mountains, near the great iron and coal deposits, which at that time were unknown. In 1852 the towns had extended as far south as the rim of the Great Basin, a distance of 200 miles or more, while all the places already located expanded by the addition of neighboring towns. From 1853 to 1856 most of the locations were along the Weber, on the east side of the Wasatch, directly east of Salt Lake City, in Cache County, in Northern Utah; along the west side of the Wasatch and in the southern part of the Territory, beyond the rim of the Great Basin at Saint George and vicinity, where our best raisins, nuts cotton, etc., are raised now. The best of the land having now been taken, it became necessary to go into the colder and more mountainous regions, and to take up the poorer clay lands of the valleys. The population had now (1870) reached 86,786, of which one-third were foreigners. The year 1869 was the year of the completion of the Union Pacific Railroad. A great influx of Eastern people now began. Mines were opened at the same time, and the industrial development of Utah may be said to have started."

Thus was settled Utah during the wagon-train period of her existence. The history of this settlement has been repeating itself ever since.

POLITICAL HISTORY.

In 1849 an attempt was made to organize the State of Deseret, but Congress refused to recognize the proposed sovereignty. On September 9, 1850, Utah was organized as a Territory, and Brigham Young was appointed Governor. The history of the Territory is punctuated by many atempts on the part of the people to secure statehood. From time to time constitutional conventions were held and many appplications made to Congress for admission, but the efforts of the people in this direction were fruitless until 1895, when, acting upon the almost unanimous demand of Gentiles and Mormons, Congress passed the Enabling Act, under which the State was admittted to the Union on January 4, 1896.

UTAH GENERALLY.

Utah occupies an important position in the trans-Mississippi group of States. It is situated between the parallels of 37 and 42 degrees north latitude, and the meridians of 109 and 114 degrees west of Greenwich. On the same parallels are Colorado, Kansas, Missouri, Southern Illinois, Kentucky, Virginia, Spain, Italy, Greece, Turkey and Corea. The State adjoins Colorado, Nevada, Arizona and Idaho. It is 275 miles in width and 345 miles in length. Its total area is 84,970 square miles; its land area is 82,190 square miles (52,601,600 acres); its water area is 2,780 square miles (1,779,200 acres).

Its valleys are elevated from 2,700 to 7,000 feet above the sea. Some of its mountain peaks reach a height of from 12,000 to 13,500 feet. The Wasatch Mountains sweep down its center, and Uintah's cross its upper half. It is a region of snow-clad mountains and broad, beautiful valleys. Many streams flow from the elevations and meander through the vales. Its largest body of water is the Great Salt Lake, covering an area of about 2,500 square miles. This is a far-famed feature of its topography; but it has

a number of fresh-water lakes of considerable size, the largest being Utah Lake, with a surface area of 125 square miles.

Within the lines of the State there exists a remarkable diversity of country, containing many unique features, some of which have given it world-wide fame, such as the Grand Canon of the Colorado and other wild scenery in the southern portion.

Extending from Idaho to Arizona, southeasterly through the State, is a chain of fertile valleys, some of which are twenty miles wide. These valleys differ in altitude—each growing the products of field and orchard to which the climatic conditions are most favorable. The most northern in this chain is Cache Valley, having an altitude of 4,400 feet, and a population of about 18,500. Here are raised the hardier fruits, grains and vegetables. In all of Utah is not found so beautiful a pastoral scene as that presented to the beholder who looks down upon the Cache Valley from the temple top at Logan. The little Mormon farms, some green, some golden, and all dotted with cozy houses and ample barns, lie side by side as regular as the squares on a checker board. Streams, natural and artificial, lined here and there with rows of stately poplars, bound the farms. The whole scene is one of contentment. It covers 600 square miles, and, framed with the snowy summits of the Wasatch, is among the prize spectacles of Utah. The southern valley in the chain is the Rio Virgin in Washington County, where the land is exceedingly productive, and where there are twenty or more settlements having a population in the aggregate of from 6,000 to 7,000. This portion of the State is semi-tropical, and its soil and climate adapt it to production of not only many of the hardier fruits, but of nectarines, almonds, figs, grapes and pomegranates. Flowers bloom in this valley in December, and cotton is extensively grown. Outdoor gardening begins there in the latter part of January, and snow and frost are almost unknown. Washington County is the Southern California of Utah, and St. George, its capital, is certain to become a famous winter resort. Between these extremes of the chain are situated many valleys under a high state of cultivation. These different portions of the State will be more extensively discussed in connection with the subject of agriculture.

The eastern half of the State is drained into the Colorado. The mountain ranges usually run north and south, and nearly all of them contain zones of precious metals. Probably no other State in the Union has within its borders such a variety of resources. No other State could be so nearly independent and self-supporting. If intercourse with the outside world were totally cut off there are very few of the necessaries or luxuries that could not be produced in abundance within the boundaries of Utah. It is an empire within itself. This fact will be easily realized by a study of the endless varieties of products it annually yields. Although but half a century has been devoted to its development, the extraordinary scope of its possibilities in mining, agriculture, ranch and range production and internal commerce, already established, proves beyond question that the State is destined to be one of the greatest commonwealths in the West, and that even now much of what is imported into the State might easily be produced at home should it become necessary.

Almost every variety of climate, which is generally salubrious and agreeable, can be found in Utah. There are valleys for the farmer, the gardener and the fruit-grower; low mountain land, slopes and terraces for the sheep-raiser; mountains for the miner; scenery, hunting, fishing and bathing for the pleasure-seeker; hot springs and pure air for the invalid, and plenty of opportunity and occupation for men of business and enterprise.

IRRIGATION.

Water has been a potent factor in the redemption of Utah from desert desolation. Here irrigation was first begun in the United States by the Anglo-Saxon race. On the very day of the arrival of the first band of pioneers in the Salt Lake Valley (July 24, 1847) work began on the first irrigation canal ever built in the nation, and then and there was commenced the development of an irrigation system borrowed by the pioneers from Spain and Egypt, which has grown into what is said to be the most perfect of any in the world outside of Spain. This system has been modeled after by all the surrounding States and Territories, and under its influence Utah has reached a high state of cultivation.

Fear of drought does not oppress the Utah farmer. He has no need to scan the sky for signs of rain, for he knows that in the arms of the mountains are held the snows, the waters of which will melt and descend to his lands ready to be given to the thirsty crops at just the right periods in their progress to insure not only their sturdy growth, but their perfect development. The life of the farmer is said to be an independent one. If this is true of the Eastern farmer, whose success is dependent upon rainfall, it is doubly true of his Utah brother, who may water his crops whenever and to whatever extent he desires. Under irrigation lands are more productive, and they retain their fertility perpetually because of fertilizers which are constantly brought to them by the irrigation waters. It can be demonstrated that ten acres of irrigated Utah land will produce more income during a period of years than five times the same area in portions of the country dependent entirely upon rain for moisture.

In the earlier stages of Utah's development irrigation systems were put in by the co-operation of the people, but during later years incorporated companies have undertaken the construction of extensive systems, which have reclaimed or will reclaim immense areas of arid lands. These companies own great tracts tributary to their canals, and offer land for sale in small parcels at low rates and upon easy terms. To the Mormon Land System much of the success which has attended the Utah farmer is due. Under this system the holdings are small, five acres being not an uncommon-sized farm, and forty acres being considered an extensive holding. Thus, the agricultural area of Utah is made to support a large population, and the individual owner is not possessed of more land than he can successfully irrigate and cultivate.

In the report of the Special Committee of the United States Senate on the irrigation and reclamation of arid lands, published by the Government in 1890, the following interesting statements are made:

"The conditions surrounding irrigation in Utah deserve the most careful review. They differ in many respects from other sections of the arid region. This difference begins with the physical features, and runs into all the social and economic aspects also. * * * The industrious people who have held this Territory since early in the '50s have made available in detached portions of Utah a considerable area of arable lands, by the careful use of every spring, pool, creek or mountain stream that can, by simple means, be coaxed down to the valleys and plains below. * * * *

"There are about 800,000 acres under cultivation in Utah, a considerable area being benefited by natural sub-irrigation. An estimate of 200,000 acres more will cover all that can be cultivated by the present ditches, and 3,500,000 acres is the outside estimate given in the evidence of the amount reclaimable under reservoirs proposed by witnesses and in country reports.

"Irrigation has prevailed in Utah for nearly forty years. Not one-fifth of the present population could be sustained without it upon the soil of the Territory. As it is, Utah feeds not only its own population, but has a considerable surplus for sale to others. * * * It will be seen that Utah

supports a considerable farming population—more, perhaps, per acre than elsewhere in the United States. * * * The largest farm reported to the committee had but 200 acres in it. The average Utah farm is about tweny-five acres. Very few Utah farms are under mortgage. The average length of the ditches does not exceed three miles. * * * One cubic foot of water has supplied, during the past year, about seventy-five acres of land. The cost of water is less per acre to the Utah farmer than elsewhere in the arid region, ranging as it does from 25 cents to 60 cents per acre. In a few instances only it will cost $3 per acre, but it seldom reaches even $1. * * * Nearly every mile of canal or ditch in the Territory has been constructed by combined and neighborhood effort. In actual cash these ditches have cost not to exceed $2.50 per acre; counted as paid in labor, however, the cost has been about $4 per acre. That will make a nominal cost for 650,000 acres, $2,600,000; the actual or cash cost may be put down at $1,625,000. There has never been a lawsuit over water rights."

The following statistics are taken from the report of the Utah Irrigation Commission, published in 1895:

The total acreage of irrigable land in Utah, outside of present (Indian) Reservations	2,304,000
The total acreage of irrigable land in Utah, inside of present (Indian) Reservations	1,350,000
	3,654,000
The total acreage covered by present ditches is	1,035,226
The total additional acreage susceptible to irrigation and for which water can be had is	2,518,774
Number of acres entered under all U. S. laws	2,542,836
Estimated number of acres of surface land still subject to entry under the public land laws	6,919,840
Estimated number of acres, unsurveyed, subject to entry	26,882,853

In the same report Mr. C. L. Stevenson, an irrigation engineer of Utah, estimates the average present value of the irrigated lands of the State at $84.25 per acre.

Instances innumerable might be given where competences and fortunes of considerable magnitude have been made by the Utah farmer, but space in this account will not permit fuller discussion. It is enough to say that there are no more prosperous farmers in the United States than those of Utah, and that crop failures, droughts, devastations by insects and the other calamities which come to the farmer in different portions of the country are not enumerated in the Utah farmer's category of ills.

The following discussion of the

DRAINAGE SYSTEMS

of Utah, condensed from the Government publication (1879) on "The Lands of the Arid Region," by Major Powell, will acquaint the reader with the number and flow of Utah's principal streams, and give him some further information in relation to irrigation to Utah:

"The eastern part of the Territory is drained by the Rio Colorado and its tributaries; the western part by streams that head in the Wasatch and the high plateaus of the central part, and find their way into the salinas and desert sands of the Great Basin. Thus we have the Rio Colorado drainage area and the desert drainage area; the former about two-fifths, the latter about three-fifths of the total area. The Rio Colorado drainage area is subdivided into the Uintah-White Basin, with 280,320 acres of irrigable land, and the Cañon Land, with 213,440 acres. The desert drainage area is subdivided into the Sevier Lake District, with 101,700 acres of irrigable land, and the Great Salt Lake District, with 837,660 acres.*

*NOTE.—Further investigation indicates that the irrigable land was at that time considerably underestimated.

"Great Salt Lake Drainage System.—Three rivers enter Great Salt Lake, namely, the Bear, the Weber and the Jordan, 'and upon their water,' says Mr. C. K. Gilbert of the Geological Survey, 'will ultimately depend the major part of the agriculture of Utah.' They rise close together in the western end of the Uintah Mountains, and cut through the Wasatch. Bear River flows northward, now in Utah, now in Wyoming, and into Idaho as far as Soda Springs. Here it bends round like a fish-hook, and returns on a more westerly line. Re-entering Utah in Cache Valley, it passes thence by a short cañon to its delta-plain on the northeastern border of Great Salt Lake. Its principal tributaries are received in Idaho and Cache Valley.

"Cache Valley, in Utah and Idaho, contains upward of 400 square miles of irrigable land. The left bank (of the Bear) is served by Logan River and tributaries; the right bank by a canal (not yet constructed) entirely in Idaho. The expense of the latter will be great, but well warranted. The valley is higher and somewhat colder than the Salt Lake Valley, but the soil is good, and the climate admits of the growth of wheat, oats, corn, rye, apples, pears, cherries, apricots, plums, peaches, etc. The valley is about ten miles in width by fifty miles in length, dish-like in shape, walled in by mountains, but pretty well farmed all around at the foot of the mountains. It sustains nearly a score of flourishing towns.

"The mean annual flow of Bear River, where it enters Salt Lake Valley, is about 5,000 cubic feet per second. Its delta-plain contains about 220 square miles of unsurpassable soil, upon which the Bear River Canal Company has diverted 2,000 second-cubic feet of water through upward of 100 miles of canals, at a cost of nearly $3,000,000. The soil is rich and ideally adapted to irrigation, having a gentle fall, being smooth as a floor and well and deeply drained by the Bear and Malad rivers.

"As if to forever bar a water famine in Salt Lake Valley, nature has provided a natural reservoir in Bear Lake, situated near Bear River, and connected with the river by a narrow outlet high up in the mountains. The lake has an area of 150 square miles, and can be raised ten feet by a dam thrown across the outlet at slight expense. Thus enough water can be stored during three-fourths of the year to flow 5,000 feet per second during the other fourth of the year. Bear River itself can be turned into the lake by a short canal and upon its upper tributaries, on the northern slope of the Uintah Range, there are many glacial lakes which can be made use of for impounding water.

"The Weber River runs in a general northwesterly course from the Uintah Mountains to Great Salt Lake, entering the latter at the middle of its eastern shore. The Ogden is its only important tributary. Its delta-plain comprises about 220 square miles of farming land. If the river prove incompetent to water its delta-plain, the Bear at the north and the Jordan at the south have each a great volume of surplus water, and either supply can be led without difficulty to the lower levels of the delta of the Weber. Besides the delta of the Weber, there are forty to fifty square miles of irrigable land on the Weber and the Ogden rivers within the mountains.

"The Jordan River is the outlet of Utah Lake, and runs northward, entering Great Salt Lake at its southeastern angle. On the right it receives a number of large tributaries from the Wasatch. The largest tributary of Utah Lake is Provo River, which rises near the source of the Weber and the Bear in the Uintah Mountains. Minor tributaries of Utah Lake are American Fork, Spanish Fork, Hobble Creek, Payson Creek, Salt Creek, etc. On all the tributaries of Utah Lake there are about 320 square miles of irrigable land; and in Jordan Valley, below Utah Lake, inclusive of Bountiful and Centerville, there are about 250 square miles. In addition, the water can be carried around the point of the Oquirrh Range on the southern shore of Great Salt Lake, and be used to water fifty square miles in Tooele Valley.

"Utah Lake is a natural reservoir, 125 square mile in surface area. With suitable headworks its volume can be controlled, and the entire discharge be concentrated in the season of irrigation. The mean volume of the outlet is about 1,000 second-cubic feet, but one-fourth of this must be assigned to watering lands on the tributaries of the lake and to evaporation, leaving a perennial flow of 750 second-cubic feet, which, if concentrated into four months, would irrigate for that period 350 square miles.

"There is thus water enough forever assured to irrigate every acre of the eastern border of Great Salt Lake Basin, from Nephi on the south to Bear River Cañon on the north, a distance, as traveled, of about 180 miles. This fringe of the desert, between the Wasatch and Great Salt Lake and between the Wasatch and Utah Lake, is, in location, resources, climate, fertility, potentially the glory of the earth. It is easily the garden spot of Utah. It supports more than thirty settlements or towns, and more than half the population of Utah. Every acre of the land is intrinsically worth $100, although it ranges in price all the way from $5 to $225 per acre. The average, away from the suburbs of larger towns, is perhaps $50 an acre. Altogether, about 10,000 second-cubic feet of water perennially flows into Great Salt Lake.

"Westward of Great Salt Lake there are sixty small tracts of land blest with water. On the east of the lake the rivers carry the melting snows of the elevated zone to the valleys, and fertility is the result. West and north of the lake the mountains are too insignificant to store up snow-banks until the time of need. These streams are spent before the summer comes, and only a few springs are perennial. The result is a desert, with little oases a day's journey apart.

"Sevier Lake Drainage Basin.—According to the accomplished geologists of the United States Geological Survey, which this sketch follows, the Wasatch ends with Mount Nebo, which overhangs Nephi. The elevated lands southward these gentlemen term the High Plateaus, divided by great longitudinal faults into three ranges, each made up of different members, as the San Pete, the Pahvant, the Tushar and the Markagunt, facing the Great Basin; the Sevier and Paunsagunt between Sevier and Grass valleys; and the Wasatch, the Fish Lake, the Awapa and the Aquarius, east of Grass Valley. The Pahvant and the Tushar, says Captain Dutton, present a curious admixture of plateau and sierra, but the others are true tables, made and kept so by the lavas which cap them and successfully resist erosion.

"The Wasatch Plateau is east of San Pete Valley, above which it rises a full mile. Sanpitch River, the largest tributary of the Sevier, furnishes water, and the oats and wheat grow higher than the fences. There is coal in the valley, fine building and flagging stone, a score of towns and settlements, and 50,000 to 100,000 acres of irrigable land. The Sanpitch empties into the Sevier at Gunnison, the latter coming down from the south, the former rising about Mount Nebo and flowing southward.

"From Gunnison to Monroe, Sevier Valley is about five miles wide by sixty miles long, and sustains a dozen settlements. The river canons above Monroe, and just above this canon tower the rugged peaks and domes of the Tushar (Beaver Range), upon whose shaggy slopes, descending to the Sevier, is the mining district of Marysvale, just now rousing itself, or being roused, from a Rip Van Winkle sleep of twenty years.

"Twenty miles above Marysvale is Circle Valley, where the East Fork joins the South Fork through a mighty chasm, cutting the Sevier Plateau in two. The mural walls of the opposing plateaus rise sheer above Circle Valley 4,000 to 5,000 feet. From this junction the two forks continue on through canons and valleys, ascending higher and higher the best part of a hundred miles to the springs of the basalt fields which divide the drainage of Sevier Lake from that of the Rio Colorado. There are valleys up there, says Captain Dutton, 7,000 to 9,000 feet high, with the palisades of the plateaus rising half

a mile higher, and on the great mesas forests of straight, slender pines and spruces a hundred feet to a limb and standing so thick as to be almost impenetrable.

"Just below Juab the Sevier River breaks through the Pahvant as though the latter were a fog-bank, runs far out on the desert and sinks in what is called Sevier Lake. Without storage, for which Captain Dutton says the High Plateaus offer extraordinary facilities, the Sevier and the Sanpitch rivers water less than 100,000 acres. With storage, if there is sufficient water to be stored, a thousand square miles of land might be reclaimed from the desert on the course of the Sevier River.

"Probably a hundred square miles are served by the small streams of Southwestern Utah, as at Levan, Scipio, Holden, Fillmore, Oak City, Kanosh, Beaver, Minersville, Paragoonah, Parowan, Cedar City, Pinto, Hebron, etc. In this region the water is inadequate to supply the arable land, but it can be largely increased by storage without doubt.

"Colorado River Drainage.—Of the Rio Colorado drainage system, the main channel is the river Colorado and its proper continuation, the Green River. The principal tributaries of these streams from the east are the White, the Grand and the San Juan, the White entering the Green, the Grand uniting with the Green to form the Colorado, and the San Juan entering the latter about 125 miles below the confluence of the Grand and the Green. The tributaries from the west are the Virgin, the Kanah, the Paari, the Escalante, the Fremont, the San Rafael, the Price, the Minnie Maud, the Uintah and the Ashley Fork.

"The climate is extremely arid, the elevation between 2,500 and 11,500 feet, giving great range in temperature. The limit of successful (hay) farming is about 7,000 feet. Aside from the Uintah-White Basin, which contains more than half of the irrigable land of the entire district, and which is an Indian Reserve, the lands are generally on benches or terraces, or in restricted valleys between the higher courses of the streams and their canons, and from 4,500 to 6,000 feet in altitude. The Price, the Uintah, the Green and the Grand have plenty of water, but, excepting the Uintah, the land upon which their waters can be diverted is very limited. On the Virgin, which is far south and low in altitude, there are thirty to fifty square miles. In the entire district there may be a thousand square miles of irrigable arable land.

"From a cursory examination and estimate of the water supply, made under Major Powell's auspices in 1877, the land in Utah which may be irrigated was tentatively put at 1,433,060 acres. Later and more thorough investigation by the Utah Irrigation Commission places the number of acres capable of irrigation at 2,304,000.

"Upon the high mountain slopes and mesas are the forests. All the timber trees proper are coniferous, and belong to the pine, fir and juniper families. There will doubtless always be enough timber and lumber for domestic use, as the new growth should replace the consumption. The farming lands, on the lower courses of the rivers and near the mountains, are limited in extent, and coal is so plentiful as to be universally used for fuel. No timber or lumber should ever be exported from Utah, nor are they likely to be. Major Powell estimates the timber region at 18,500 square miles, standing timber at 10,000, milling timber at 2,500 square miles, sufficient, he says, for the industrial wants of the country if it can be preserved from forest fires.

"The elevated regions not only store the moisture to fertilize the adjacent lowlands, but they contain the mines of silver and gold, of lead and iron, and of other metals and minerals, and the coal.

"The grazing lands lie, in the main, between the high timber lands and the low farming lands. The grass is scanty, but in great variety and nutritious.

"Wherever grass grows, Major Powell says, water may be found or saved from the rains in sufficient quantity for all the herds that can live on the pasturage."

GEOLOGY AND MINING IN GENERAL.

The following condensation is made from Professor Jones' admirable book upon Utah:

"The deposits of the precious metals of Utah all belong to the early geological ages, with the exception of a few small outcroppings in Southern Utah, in a very unique deposit. The minerals are generally contained in fissures of varying width and richness, running, not along the line of a mountain range, but directly across it, stretching from one range of mountains to another, and doubtless going underneath the valleys in a direction nearly east and west. These veins seem to traverse nearly the whole of the Great Basin from east to west. The most valuable deposits are generally found in the earliest granites, quartzites or palæozoic limestone. One of the most important mineral belts of Utah runs from the Uintah Mountains on the east through Park City and Alta in the Wasatch, thence across the Salt Lake Valley to the Oquirrh Mountains on the west at Bingham, the original point of discovery of mines in Utah, and then turning a little northward, crossing diagonally through the Aqui Mountains, and thence out on the desert.

"The second mineral belt begins in the Wasatch Mountains, in the vicinity of Mount Nebo, and runs a little north of west, reaching its climax in the extension of the Oquirrh Range at Tintic, thence it passes through various ranges until it goes out of the State at Deep Creek, which is destined to be one of the greatest mining camps in Utah.

"The third belt is located some 200 miles south of Salt Lake, beginning at Marysvale and Beaver, running a little north of west through various ranges, reachings its climax at Frisco, where the great Horn Silver Mine is located. The belt extends westward from there to the boundary of the State.

"Near the southern boundary of the State, on the rim of the Basin, is a very unique mineral deposit in sandstone of the Triassic or later date. The ore is chiefly chloride of silver, found in reefs of sandstone which are tilted at a high angle.

"The eastern portion of the State, being of a very recent geological age, is almost destitute of precious metals. There are some limited areas of volcanic outbursts in this region, where there is some mineral. This is pre-eminently a coal country, having thousands of square miles of coal fields, with veins in some places forty feet thick. This region has other forms of carbon besides coal, the principal ones being natural gas, paraffin, heavy oil and asphaltum of all grades. Here also are found large deposits of the hydrocarbons, gilsonite, elaterite and ozocerite, which electrical development is rapidly bringing into general use."

Mining in Utah is conducted in much the same way that it is elsewhere. In most portions of the State lode claims are 1,500 feet long by 600 feet wide. In the absence of a State law fixing the amount of labor necessary to hold a location, the customs of miners and the rules of mining districts regulate the amount. This, of course, is additional to the annual labor or improvements required by the Acts of Congress.

The spirit of boom and hurrah has always been noticeably absent from the mining men of Utah. These men, or a large proportion of them, obtained their preliminary training in Nevada and California, where mining is, and always has been, conducted upon legitimate lines, and where results count for more than anticipation. The history of Utah contains no record of great mining excitements. Other States can and do have their Cripple Creeks and Creedes, where excitement runs high and everyone seems possessed to keep it up. But Utah never has had, and probably never will have, a genuine mining craze. The people are not built to produce and keep up mining excitements. They are conservative and unboastful. They regard mining as a legitimate business, and prefer to look to dividends rather than to the rise of speculastocks for their profits.

No special effort is made by the people of Utah to have the news prints of the country advertised, by news or paid notices, the progress of mining development, and for that reason the mining fame of the State is not so widespread as that of other States whose output and mining dividends do not compare with those of Utah. An examination of a table which appears elsewhere in this account will show that this State has a total metal product valued at $234,703,580.23. For many years a steady stream of dividends has been flowing from the mines to their owners, as will be seen by accompanying tables.

These figures are given to the reader that he may judge of the mineral greatness of Utah, a greatness which the work of development now but fairly entered upon will make phenomenal in the near future. The tables and mining statistics presented are complete to January 1, 1901, and of the showing they make the State may well be proud:

TABLE OF MINING DIVIDENDS.

Mines.	Capital.	Total Dividends.
Ajax (Copperopolis)	$3,000,000	$1,000,000
Bullion-Beck	1,000,000	2,535,000
Centennial-Eureka	1,500,000	2,447,700
Crescent	1,500,000	280,000
Chloride Point	500,000	5,000
Consolidated Mercur	10,000,000	110,000
Carisa	.....	85,000
Daly	3,000,000	2,397,500
Dalton and Lark	2,500,000	87,500
Daly-West	3,000,000	487,500
Eureka Hill	1,000,000	1,850,000
Grand Central	250,000	631,250
Geyser-Marion	1,500,000	96,000
Gemeni-Keystone	500,000	825,000
Grand Gulch	.....	4,800
Horn Silver	10,000,000	5,290,000
Mercur	5,000,000	1,481,000
Maxfield	3,000,000	117,000
Mammoth	10,000,000	1,780,000
Ontario	15,000,000	13,662,500
Silver King	3,000,000	3,475,000
Sacramento	5,000,000	118,000
Swansea	500,000	271,500
South Swansea	150,000	162,500
Silver Shield	30,000	1,500
Rocco-Homestake	300,000	4,500
Petro	1,500,000	33,000
Utah	1,000,000	179,000
Utah Consolidated	750,000	63,000
Galena	1,000,000	71,000

The mines named in this table are those which exhibit their dividends and are but a few of the many great producers of the State. There are hundreds of properties under private or corporate ownership in Utah, about the annual profits of which we are left entirely to conjecture. Our Eastern friends who take statements concerning the West with a grain of allowance are urged to verify the figures contained in this table.

UTAH'S CURIOUS MINERAL PRODUCTS

are of many kinds, the most noteworthy being the sandstone silver mines of Southern Utah. The discovery of silver in sandstone was made by Judge Barbee at Leeds, in Washington County, over a quarter of a century ago. The mines he located have paid to this time over one million dollars in profits. The sandstone deposit contains the petrified remains of a prehistoric forest, and the richest ores found have been portions of these petrified trees. Utah alone possesses this mineralogical curiosity. Its existence contradicts old geological theories and teaches us how little, after all, we know of nature's wonderful methods.

Utah illustrates perhaps better than any other part of the world the truth of the couplet—

"God moves in a mysterious way
His wonders to perform."

He seems to have selected the State for the exhibition of the utmost powers of creation, and has given to it almost every form of mineral wealth.

Less curious than the sandstone mines, but very interesting, are the great bodies of asphaltum and the hydrocarbons, which occur generally over a thousand square miles or more of the region in Northeastern Utah, in part reserved to the Uintah and Uncompahgre Indians.

The asphaltum is found in limestone, sandstone and in flowing springs and lakes. In quality it is the equal of any in the world, and in quantity there is sufficient of it to pave all the streets in America and still leave enough for the uses of mankind for centuries to come. Aside from a small amount mined in California, practically all of the asphaltum used in the United States is imported from the Island of Trinidad. This importation is carried on by a company, which, because of its control of the source of the material, has grown into a gigantic monopoly, and dictates terms to most of the great municipal corporations of the country. With Utah's enormous bodies of asphaltum, there need no longer be any reason for maintaining this monopoly or for veneering the streets of American cities with a foreign product.

GILSONITE, of which the largest known vein is forty feet wide and twenty miles long, is peculiar to Utah. Its discovery in the State is attributed to Mr. Sam Gilson of Salt Lake City, after whom it was named by the Smithsonian Institution. This material is used in the manufacture of black japan and other varnishes, in making insulating compounds of various kinds, in covering iron plates on ship bottoms and to protect pilings subject to the ravages of toredo and other salt-water insects. This form of asphaltum was formerly imported from Egypt to the United States, commanding a price of $250 per ton. The Utah product has driven the Egyptian article out of our market, as it can be delivered on the cars at Price for $40 per ton.

The Gilsonite Asphaltum Company of St. Louis, Mo., shipped from Price 4,587,630 pounds of asphaltum in 1900, an increase of 1,500,000 pounds over the output of the preceding year. This nets the company about $40 per ton on board the cars at Price.

Shipments were made from other properties, of which there are many in the great hydrocarbon field, but exact figures are not obtainable.

Of the hydrocarbons mentioned there is enough to supply all the uses for which they are employed for all time to come, but little seems to be known of one of these products (elaterite) and the purposes for which it can be used. The world's supply has heretofore been obtained principally from Austria and Syria, where the ouput is comparatively limited, and therefore they have commanded a high market price. All of these several forms of carbons are found in Utah in exceedingly pure condition, and when they can be sent to market they will undoubtedly drive out the imported materials.

ELATERITE is a sort of mineral rubber, and is awaiting a cheap means of reducing it to solution, so that it can be economically used upon the bottoms of ships. It is said to furnish complete protection against the barnacle, and that it will save millions of dollars annually to the ship-owners of the world. The Government has recently caused experiments to be made for the discovery of a cheap method of reducing it, and the claim is made by one chemist that this can be done at a cost of 30 cents per gallon. The substance is difficult to mine. It cannot be drilled, being like gutta-percha, and augers are used to prepare it for blasting.

OZOCERITE, or mineral wax, is similar in many respects to paraffin, and is an extreme product of petroleum. The chief supply now comes from Galicia, the mines of which are said to be wholly inadequate to supply the demand for

the product. This is the material used by Mr. Edison for the cylinder of his phonograph. In crude condition it is dark-colored, but it can, by chemical treatment, be made white and used in the manufacture of candles. As a material for waxing ball-room floors it is said to have no equal, and it is a valuable element in the manufacture of acid and water-proof paper. Its chief use, however, is for insulation, for which purpose it is said to be more valuable than any other substance.

In enumerating Utah's mineral curios, mention should be made of the peculiar form in which gold is deposited at Mercur, a camp fully discussed later in this account. It is contended that the chloride of gold has never been found in nature, but there are many men of high scientific attainments who insist that the gold found at Mercur is in that form, and that the ores are therefore most easy of treatment by solution methods.

The Great Salt Lake is a mine as well as a health and pleasure resort. Its interesting features and supposed origin are treated under a separate head in this book, but in this connection it should be given its place among Utah's mineral marvels. The large per cent. of salt contained in its waters makes the lake a fruitful source of revenue to Utah, and the lake itself is a curiosity of ever-increasing interest. Nature has deposited in its waters salt enough, which, if extracted and sold at the market price, would realize, it is said, a sum ample to pay all the national debts in Christendom, and still leave a fair fortune for every man, woman and child in the United States. A gentleman handy with figures recently computed the bulk of this salt to be sufficient, if extracted, to load a train long enough to reach 196 times around the earth and leave an 8,000-mile string of cars on a sidetrack. These figures are given in order that the reader may approach to a comprehension of the wealth carried in solution by the waters of this inland sea. The lake is certainly one of the marvels of creation, and is entitled to a place among the freaks in Utah's museum. So much for the rare and curious.

Next to be considered are some of the other mineral treasures in the State, which are being mined and marketed, but which do not belong to the same family of metals as gold, silver, copper and lead—to the production of which the mining of the State is principally directed.

Sulphur is found, of course, in many parts of the world, but it is doubted whether any known deposit exceeds in richness and size the deposits found in Beaver and other counties of Utah. An expert from the mines of Sicily once told the writer that there was then more sulphur in one mine now being operated in Beaver County than in the whole sulphur field of Sicily.

Near Black Rock is the crater of an extinct volcano filled with a sulphur deposit going from 60 to 90 per cent. pure. Works at this point have a capacity of twenty tons per day, and lump and other forms of refined sulphur are produced. The output of these and other works in the State is limited solely by the demand. Other deposits are found near Frisco, where the material occurs in crevices, and is very pure. A fine deposit, running 67 per cent. pure, has also been opened in the Uintah Mountains.

On the Rio Virgin River, in Southern Utah, exists veins of pure salt which might easily be taken for veins of the clearest ice. One of these veins stands like a crystal mountain above the valley, and the material is so clear that print can be distinctly read through a block of it. The writer is indebted to Mr. Stanislaus de Yurski, an eminent expert of Austria, for the information that this peculiar form of salt is found only in Utah and Galicia.

Saltpeter is found in a valuable bed in the south end of the Salt Lake Valley.

Alum Shales occur in many localities.

Deposits of Gypsum, practically inexhaustible, have been located in several portions of the State. One outcrop at Nephi is 1,200 feet long, and contains enough gypsum to supply all possible demand for many years. Upon this deposit is situated the mill of the Nephi Plaster of Paris Manufacturing

Company, which manufactures and ships to all portions of Utah and to California, Idaho, Montana, Oregon, Washington and British Columbia large quantities of plaster of paris. This gypsum is said to be the purest known, and shows the following analysis:

Lime	33.60
Sulphuric acid	43.07
Water	23.33
	100.00

The output of the Nephi plant for 1900 was 200 cars.

Selinite of great purity, rotten stone, sometimes called tripoli, the real tripoli, mica, antimony, quicksilver, asbestos, graphite and many other of the less common minerals, mineral paints and the gems, topaz, garnet, ruby, chalcedony and amethyst may all be enumerated in Utah's inventory of mineral wealth.

Indications of PETROLEUM that are likely to lead to a profitable development are present in Emery County, near Pleasant Valley, and on the Green River. Stimulated by the oil development in Southern California, many petroleum locations were made in the Green River country during 1900 by people who freely predict the existence there of a rich and extensive field.

CLAYS.—A great variety of rich and beautiful clays exist in Utah, almost every county having a deposit of some kind. In Salt Lake County, near Draper, is a vast bed of kaolin, from which articles of delicate and purest white pottery have been made in an experimental way. At the base of the Wasatch Mountains throughout Utah County is a deposit of black clay of the finest quality. Brick clays, from which first-class pressed and common brick are manufactured, are found nearly everywhere throughout the State. The brick produced is of almost every color and tone. From Salt Lake fire-clays are produced a first-class quality of fire-brick. Brick manufacturing is extensively carried on at Salt Lake, and brick of exceptionally fine quality and appearance was turned out to the number, in 1900, of 23,200,000, of which 18,200,000 were sold.

PORTLAND CEMENT.—The Portland Cement Company of Utah is now making a true artificial Portland cement, and during the year 1900 sold 60,000 barrels. The plant is now manufacturing cement at the rate of 400 barrels per day, the company having expended $30,000 for improvements during the past year.

Veins of BISMUTH have been found in Beaver County, near Beaver City, carrying from 1 to 6 per cent. of the metal. This metal has also been found in the mines of Bingham, but there are at present no reduction works specially designed for its extraction.

SODA and NITRE exist in Weber, Utah and other counties, and ALUM in abundance in Iron County.

MARBLE.—Of this Utah possesses great quantities and many varieties. White, mottled, pink, geodic and black marbles are found in large deposits and in many localities. The largest marble deposits are at Frisco, in Beaver County, but workable bodies occur in Spanish Fork Cañon, on Deep Creek, and in other portions of the State. Geodic marble, composed of a mass of impacted little geodes, is found in large quantities, and when polished makes a novel and beautiful finishing material. A large deposit of this peculiar marble is now being opened on Hobble Creek by the Hobble Creek Marble Company. For ornamental purposes in building, the geodic marble is considered by many equal to onyx. The writer knows of no deposits except those found in Utah. The building done in Salt Lake during 1900 evidences a greater use of stone than ever before. For fine residences especially it seems to be leading its less expensive brick competitor.

ONYX.—The Utah product differs from the onyx imported from Mexico, in that it is free from the checks and fractures which mar the appearance of

the imported article. It exceeds in beauty all other local building materials, and is found in a great diversity of colors and in practically inexhaustible quantities. The largest mines are situated in Utah, Cache, Millard and Box Elder counties. This material was used in wainscoting the million-dollar city and county building in Salt Lake, and its interior is offered by Utah in evidence that Utah has the finest onyx in the world. The most beautiful colors and forms are blended in its texture, and for mantels, pillars and interior ornamentation it is fast coming into general use among local builders. Some outside shipments have been made, but the value of the material has not become sufficiently known to Eastern builders to secure for it a market in competition with the Mexican product. Pieces four by six feet are easily mined and are polished at a low cost.

ALABASTER, of the pink variety, occurs in Utah County in extensive deposits. This material is too soft to be susceptible of a high polish, but presents a very pretty appearance when finished, and will no doubt in time be extensively mined.

PUMICE.—Near Black Rock station, Beaver County, there is an immense bed of pumice stone, more being in sight than can be used in the next twenty years. This is quarried out and sent in car lots to Chicago, where it is pulped and manufactured into various articles for polishing wood and other substances, smoothing paint surfaces, scouring bricks, etc. This article is shutting out importations which formerly supplied all he United States with pumice stone, and it promises to become an important manufacture.

BUILDING STONE.—Utah excels in the quality of her red and gray sandstone, of which there are inexhaustible quantities. These sandstone crop out for several hundred miles on the eastern side of the Wasatch, and are in much demand for general building purposes. The stone also occurs at Spanish Fork Cañon, where it varies in color from a red to a light brown, and at Kayune, from whence it is extensively shipped to Denver and other Eastern points. Of limestone Utah has a surfeit—it is everywhere. It is employed in making lime, and much of it seeks the smelters for fluxing purposes. Granite is not generally used, though the Mormon Temple at Salt Lake, a building which cost $4,000,000 and which will stand the wear and tear of time for centuries to come is built of it. The material for the Temple was quarried from a large deposit at the mouth of the Little Cottonwood, near Salt Lake City.

SLATE occurs in many places, the finest in quality and color being on Antelope Island, in the Great Salt Lake. Near Utah Lake there is also a fine deposit from which slabs from an inch to several feet in thickness and perfectly uniform in texture can be taken. One of the most beautiful of building stones possessed by Utah is the oolitic sandstone of Manti. This is composed of minute shells, compacted, and is so soft that when first taken out it is readily cut with a saw. Being very white, it is in demand for trimmings, and is very ornamental.

Discoveries of LITHOGRAPHIC STONE have been made in various parts of the State, but so far none has been marketed. Millard, Utah and Salt Lake counties each claim to possess deposits of superior quality. Near Cisco, in Grand County, the West American Agate Company have been operating the agate fields, and have spent several thousand dollars in development. Large boulders of CHALCEDONY, big enough to make table tops, are there found, ranging in color from bloodstone to carnelian.

COAL.

Professor Jones has this to say about Utah's coal fields:

"Geologically, our coals belong to the cretaceous age. After the basin was upheaved in which the coal was formed, a large lake was left in the center,

the waves of which gradually wore away the shores until the coal deposits cropped out in precipices 1,500 feet high. The streams also cut box canons at right angles to the shore line, thereby exposing the nearly horizontal coal beds in multitudes of places, so that to take out coal it is necessary only to run a tunnel in on the bed and cart out the fuel.

"This does away with all the costly hoisting machinery so common elsewhere. This coal belt enters Utah near Evanston, Wyo., forms a large basin near Coalville; then runs east along the north side of the Uintahs to and around the eastern end of the mountains; thence west back along the south side to the head of Spanish Fork Cañon, where it forms the Coal Range, the watershed between the Colorado and the Great Basin; thence it runs in a southerly direction for many miles, and then bends westward past Cedar City (near which are the iron deposits) and Kanarrah; thence west until it passes out of the Territory (State) above Saint George. * * * In the southwestern part of the Territory (State) the deposits are small, while between Iron City and the Uintahs they are very heavy.

"This coal field, 600 to 1,000 miles long, is ten miles wide in the narrowest place, while in others it may run up to twenty-five miles. It is estimated that we have 20,000 square miles of coal lands in Utah, but this is an exaggerration; still we have immense bodies of thousands of square miles, and of such thickness as to supply the whole United States for centuries. Another valuable feature of our coal is its proximity to the mineral deposits, both iron and the precious metals. There is no coal to the west of us except some poor lignites, scarcely used, in Southern California; so we shall always supply the Great Basin, and at least part of California, with coal. At Coalville the workable vein is 10 to 13 feet thick; at Pleasant Valley there are two veins, one 13 and the other 28 feet thick; at Castle Gate the largest vein is 14 feet."

The Union Pacific made the following excellent showing with the output of their several mines in Wyoming and Utah in 1900:

OUTPUT OF UNION PACIFIC COAL MINES FOR 1900.

	Tons.
Rock Springs, Wyoming, Mine No. 1	479,801
Rock Springs, Wyoming, Mine No. 7	201,051
Rock Springs, Wyoming, Mine No. 8	273,905
Rock Springs, Wyoming, Mine No. 9	292,783
Carbon, Wyoming, Mine No. 2	93,416
Carbon, Wyoming, Mine No. 7	50,351
Hanna, Wyoming, Mine No. 1	340,000
Almy, Wyoming, Mine No. 7	22,431
Weber, Utah, Mine	42,644
Total Union Pacific Mines	1,796,382

PRODUCTION OF UTAH COAL MINES FOR 1900.

	Tons.
Pleasant Valley Company	984,399
Grass Creek Company	32,360
Sanpete County	7,500
Uintah County	6,500
Emery County	8,000
Grand County	1,000
Other Small Mines	52,500
Total tons Utah Mines (exclusive of Weber U. P.)	1,092,259

ANTHRACITE.—1895 marked the discovery of anthracite coal in Utah. The stratum of this valuable fuel was found between walls of carboniferous limestone, on a bedding of shale in the mountains east of Provo. The analysis shows 65 per cent. fixed carbon, 15 per cent. ash and 20 per cent. moisture and volatile matter. The vein is from three to five feet in thickness and shows a widening tendency. The outcrop can be traced nearly the entire length of Utah County, and a number of locations have been made upon the vein. An

excellent quality of coke is made from Castle Gate coal. Something like fifty coke workers are employed at the coke ovens connected with these mines, and the amount shipped approximates 25,000 tons per year. The largest local market for coal in Utah it at Salt Lake City, which consumes about 120,000 tons annually. The following are the prevailing Salt Lake prices (October, 1898):

	Retail Deliv.	Whole-sale.
Rock Springs, Weber, Castle Gate, Diamond and Kemmerer	$5.00	$3.75
Winter Quarters and Pleasant Valley	4.75	3.50
Nut Coal, all kinds	4.75	3.50
Mine slack	2.50	2.00
Anthracite	9.50	9.00

SALT.

Utah is most generously supplied with salt, not only in veins of rock salt and in the brine of the Great Salt Lake, but also in many springs and small lakes. A company at Nephi is engaged in the manufacture of refined salt from the rock salt, and from springs found near by, and another company is doing a large business in the sale of rock salt as mined. The principal source of supply, however, is the Great Salt Lake, the waters of which carry from 18 to 20 per cent. Around the lake are numerous salt farms, provided with ponds a few feet below the level of the lake, into which the lake water is pumped or drained early in the season to a depth of two or three feet. When this water evaporates a deposit of several inches of salt remains; this is shoveled into piles for use in silver mills and on stock ranges, or to be refined for table, dairy and packers' use. The Inland Crystal Salt Company, the Nebo Salt Manufacturing Company and the Nephi Salt Mining & Manufacturing Company are leading institutions engaged in the salt business, the latter having mined 3,000 tons of rock salt last year. The production for 1900, according to the best obtainable figures, was approximately 150,000 tons, of which 20,000 tons were refined. Analyses have shown this product to be 99.927 per cent. pure, the nearest approach that has been made to absolute purity; so close, in fact, that Professor Ludeking, editor of the Medical Review, pronounces it "absolutely pure." This salt meets the Eastern article in Western Nebraska, and finds ready sale in all the country westward to the Pacific Coast. Practically all salt used in this region for stock and milling purposes is supplied by Utah. As the supply is inexhaustible and the demand constantly increasing, the salt industry promises to become a source of great revenue to the State. Further reference to the salt industry on the shores of the lake will be found under the head of "The Great Salt Lake."

IRON.

There are iron deposits that can be worked with profit in Cache, Weber, Wasatch, Salt Lake, Morgan, Juab and many other counties of Utah, but the greatest of all is in Iron County, which possesses one of the most remarkable deposits in the world. Near Cedar City is the so-called "Iron Mountain," estimated to contain 50,000,000 tons of fine iron ore. Professor Newberry has said of this mountain: "The deposits of iron ore near Iron City, in Southwestern Utah, are probably not excelled in intrinsic value by any in the world. The ore is magnetite and hematite, and occurs in a belt fifteen or twenty miles long and three or four miles wide, along which there are frequent outcrops, each of which shows a length and breadth of several hundred feet of compact, massive ore of the richest quality. There are certainly no other deposits to compare with them west of the Mississippi for the manufacture of pig and bar iron and steel, and it would be difficult to estimate the influence they would have on the industries of the Pacific Coast."

Another acknowledged expert has said: "Utah's iron resources much exceed those of any other section of the Union." All the iron ore so far mined in Utah has been red and brown hematite, of which some 12,000 tons are annually used for flux in the smelters, but when it is realized that the largest and best of our iron deposits are located close to great coal measures, it is safe to predict that the day will soon come when the iron and steel required in the western half of this country, at least, will be produced within the State of Utah: We shall have big blast furnaces and foundries, and the railroads of the West will be equipped with rails made of Utah steel; we shall make all the stoves, machinery, iron pipe and miscellaneous ironware of the trans-Mississippi country. The consummation of this hope will be reached as soon as a line of railway opens this field to Salt Lake and Southern California. At this writing this railroad has been incorporated, with ample capital for its construction.

In this account it will be impossible to mention all of the different kinds of minerals found in Utah. Professor Jones makes the statement that most of the minerals found in the West, except tin, occur in the State. The following is his

LIST OF UTAH MINERALS.

GOLD:

Placer gold—telluride of gold.

SILVER:

Argentite, cerargyrite—horn silver, chloride of silver.
Embolite—chlorobromide of silver.
Frieslebenite—sulphuret of antimony and silver.
Miargyrite—sulphuret of antimony and silver.
Polybasite.
Proustite.
Pyrargyrite—dark ruby silver.
Native silver.

LEAD:

Anglesite—sulphate of lead.
Cerussite—carbonate of lead.
Leadhillite—sulphato-tricarbonate of lead.
Galena—sulphuret of lead, galenite.
Wulfenite—molybdate of lead.
Boulangerite—sulphuret of antimony and lead.
Pyromorphite—phosphate of lead.
Linarite—cupreous sulphate of lead.
Phosgenite—carbonate and chloride of lead.
Binnite—sulpharsenide of lead.

COPPER:

Atacamite—chloride of copper.
Azurite—blue carbonate of copper.
Blue vitriol—sulphate of copper.
Chalcocite—vitreous copper.
Chalcopyrite—copper pyrites.
Chrysocollas—silicate of copper.
Cubanite—sulpheret of iron and copper.
Cuprite—oxide of copper, melaconite.
Erubescite—variegated copper pyrites, bornite.
Linarite—cupreous sulphate of lead.
Malachite—green carbonate of copper.
Tetrahedrite—fahlerz, gray copper.
Enargite—sulpharsenate of copper.

ZINC:

Calamine—silicate of zinc.
Smithsonite—carbonate of zinc.
Sphalerite—zinc blende.

IRON:

Hematite—specular iron, micaceous iron, red ochre.
Copperas—sulphate of iron.
Cubanite—sulphuret of iron and copper.
Limonite—brown hematite, brown and yellow ochre, bog iron.
Dufreynoisite—sulphate of copper and arsenic.
Franklinite.
Ilmenite—titanic iron.
Magnetite—lodestone.
Mispickle—arsenical iron pyrites.
Pyrites—bisulphuret of iron, marcosite, white pyrites.
Chrysolite—olivine.
Siderite—carbonate of iron.
Iron silicates.

ALUMINUM.

ANTIMONY:

Stibnite—gray antimony, sulphuret of antimony.
Miargyrite, cervantite, pyrargyrite.
Frieslebenite—sulpheret of antimony and silver.
Stephanite—sulphuret of antimony and silver.
Boulangerite—sulphuret of antimony and lead.

ARSENIC:

Arsenopyrite—mispickle.
Olivenite.
Orpiment—yellow sulphide of arsenic.
Arsenolite—native arsenic.
Realgar—protosulphite of arsenic.
Polybasite—sulphuret of copper and arsenic.
Proustite.
Tetrahedrite—fahlerz.

BISMUTH:

Sulphuret, telluride, bismuthite.

MANGANESE:

Bosjemanite, manganese alum, wad.
Pyrolusite—binoxide of manganese.
Rhodochrosite—carbonate of manganese.
Sulphate of manganese.
Hausmannite—oxide of manganese.

MERCURY:

Cinnabar, selenide of mercury.

MOLYBDENUM:

Molybdenite—sulphide of molybdenum.
Wulfenite—molybdate of lead.

TITANIUM:

Ilmenite.

TELLURIUM:

Telluride of gold.
Phosphate of unranium.

FORMS OF CARBON:

Coal, cannel coal, anthracite, lignite (soft coal), graphite—plumbago, ozocerite, gilsonite, wurtzellite, crude asphaltum, petroleum, natural gas, wheelerite, amber.

BUILDING STONE, ETC.:

Augite, calcite—limestone and marble.
Dolomite—magnesian limestone.
Hornblende—tremolite and actinolite.
Ooolite—oolitic sandstone, basalt, lava, rhyolite, trachyte, sandstone, slate, quartzite, feldspar, granite.

SAND, CLAY AND PLASTER:

Glass sand, oolitic sand, brick clay, potter's clay, fire clay, kaolinite—kaolin—Gunnison paint, fuller's earth, cement, lithomarge.
Gypsum—alabaster, plaster of paris and selenite.

GEMS, ETC.:

Agate, almandine, amethyst, carnelian, cat's eye, chalcedony, corundum, dentrite, epidote, garnet, jasper, jet, moss agate, obsidian, onyx, opal, petrified wood, ruby, sapphire, sard, sardonyx, spinel, topaz, tourmaline.

SALTS:

Epsomite—epsom salts.
Glauberite, halite—rock salt and lake salt.
Nitrocalcite.
Niter—saltpeter, nitrate of potash.
Soda—saleratus, sulphate of soda.

ALUM:

Kalinite—alum, alum shales, alum tufa.
Pinkeringite—magnesian alum, chiolite.

MISCELLANEOUS MINERALS, ETC.:

Albite, anthraconite—fetid limestone, apatite, argonite, asbestos, barite, barytocalcite, chalk, fluor spar.
Geyserite, hydrargyllite (alumina and water).
Hydrosteatite—talc.
Lithomarge.
Magnesite—carbonate of magnesia.
Mica—biotite—muscovite.
Phenacite—silica and glaucina.
Pyroxene—anhydrous silicate of magnesia.
Stalactites, soapstone, sulphur—brimstone.
Tripoli—tripolite.
Witherite—carbonate of baryta.
Strontianite—carbonate of strontia.
Geodes.
Mineral springs.

GOLD, SILVER, COPPER AND LEAD MINING.

Although much energy and capital is employed in producing the various forms of mineral wealth already mentioned in this account, the largest amount of capital and labor is devoted to the extraction of gold, silver, copper and lead, of which the State seems to have inexhausible quantities. Mining is, and always will be, the leading industry of Utah. According to Professor Jones, silver was first discovered in Utah in 1857, but no practical attempt to mine was made until 1863, when the Old Jordan Mine—the first staked in Utah—was located in Bingham Cañon by Gen. P. E. Connor, then the commanding officer at Fort Douglas, and a party of ladies and officers belonging to his command. Prior to this time, however, it is said that the Mormons obtained some lead from melting down galena ores in forges. The Old Jordan Mine is one of the famous mines of the State, and has been worked almost continually since its discovery. In 1864 rich placer ground was discovered in the neighborhood of the Old Jordan, from which, throughout succeeding years, large amounts of gold-dust were taken. Only an approximate estimate can be made of the output of these placers. It is of record, however, that Wells, Fargo & Co. shipped out over $500,000 in gold-dust, and the total figures are probably not far from $1,000,000.

Real mining may be said not to have begun in Utah, however, until 1870, at which time news of the discoveries in Bingham Cañon had reached Nevada, and produced an immigration of prospectors from that State. That year Buell and Bateman, from Virginia City, Nev., bought a group of claims at Bingham, which are now included in the Niagara group of mines, and in connection with these claims erected a smelting furnace. They soon opened up large bodies of good ore, and their enterprise having attracted wide attention, a bustling camp sprung up. The following year a smelter was built in connection with the Winnemucka Mine, which, during several years following, treated a large tonnage of ore from that mine, the Spanish Mine and oher properties.

Prospecting was not long confined to Bingham, but extended, year by year, into other portions of the State, until Utah's whole mineral domain was dotted with mining camps, mines and smelters.

In 1868 the celebrated Emma Mine, at Alta, made her first shipment of ore, and soon after Stockton, Ophir, Big Cottonwood, Park City and other camps, since famous for their great annual output, sprung into life. The advent of the Union Pacific Railroad into Utah in 1869 gave to the mining of the State a stimulus which can never be fully estimated, and laid the foundation for the development of what then seemed to be a purely agricultural region into one of the greatest mining States of the Union. In 1869-70 there was a stampede of miners into Utah. Mining districts were organized all over the then Territory, and hundreds of thousands of dollars were recklessly thrown away by those who knew but little about mining. As a result, a stagnation in mining occurred in 1874, continuing for some years, but this could not keep back the really good mines from producing their regular quota of bullion, which gradually increased until the value of the total annual output was many million dollars.

The table on the next page, of Utah's mineral output from 1877 to 1900, is made up from the records of Wells, Fargo & Co., bankers, of Salt Lake City. This table truthfully presents each year's production of gold, silver, copper and lead, and the value of the same as determined by the average market price prevailing during each year reported. This statement does not show the product of these metals prior to 1877, but I have added thereto Prof. Marcus E. Jones' estimate of the value of the bullion product of Utah from 1869 to and inclusive of 1876.

This enormous total of $234,703,580.23 represents the value of the product computed according to the average market price during each year of production.

DIVIDENDS FOR 1900.

Centennial-Eureka	$317,500
Carisa	35,000
Consolidated Mercur	110,000
Daly-West	487,500
Dixie	15,000
Gemini	125,000
Golden Gate	420,000
Grand Central	25,000
Grand Gulch	2,400
Horn Silver	20,000
Mammoth	220,000
Mercur	115,000
Ontario	90,000
Rocco-Homestake	4,500
Silver King	1,000,000
Silver Shield	1,500
Swansea	70,000
Utah	2,000
Total	$3,060,400

Scarcely any portion of these dividends—averaging $255,333 per month—leaves the State; they flow into the pockets of home people, and go to the development and upbuilding of Utah.

This table includes only those companies which have made public announcement of their dividends or the amount of dividends of which have been secured from reliable sources. In addition to these there are a number of close corporations which have made handsome earnings, the amount of which it is impossible to ascertain. Among these may be mentioned the Uncle Sam, Humbug and Star Consolidated, well-known large producers. All the mines mentioned in the table are located in Utah, except the Rocco-Homestake, located in Nevada, but which is owned entirely by Salt Lake capital.

WELLS, FARGO & CO.'S STATEMENT OF THE MINERAL PRODUCT OF UTAH—

From 1876 (the first year of mining) to 1901.

	Silver.		Gold.		Copper.		Refined Lead.		Unrefined Lead.	
	Amount, Ounces.	Value.	Amount, Ounces.	Value.	Amount, Pounds.	Value.	Amount, Pounds.	Value.	Amount, Pounds.	Value.
1877	4,359,703	$5,231,643.60	17,325	$356,895.00	.....	.....	.....	.....	54,936,080	$1,648,082.00
1878	4,357,328	4,923,780.64	15,040	300,800.00	.....	$24,100.00	2,620,422	$104,816.88	40,414,359	707,251.28
1879	3,835,047	4,218,551.70	15,932	302,708.00	.....	.....	2,301,276	103,557.42	26,315,359	592,095.57
1880	3,783,566	4,161,932.60	8,020	160,400.00	.....	.....	2,892,498	144,624.90	25,657,643	641,444.75
1881	4,958,345	5,503,762.95	7,958	159,160.00	.....	.....	2,645,373	145,495.51	38,222,185	955,554.62
1882	5,425,444	6,114,874.00	9,039	180,780.00	605,880	75,735.00	8,213,798	410,690.00	52,349,850	1,361,096.00
1883	4,531,763	4,984,939.00	6,991	139,820.00	557,875	94,681.25	3,230,547	161,527.00	63,431,964	1,585,799.00
1884	5,669,488	6,123,047.04	5,530	110,600.00	63,372	6,337.20	4,840,987	169,434.54	56,023,893	980,418.12
1885	5,972,689	6,221,596.56	8,903	178,060.00	.....	.....	.....	.....	54,318,776	1,222,176.46
1886	5,918,842	5,860,837.34	10,577	211,540.00	2,407,550	144,453.00	208,820	9,667.44	48,456,260	1,405,231.54
1887	6,161,737	5,976,884.89	11,387	227,740.00	2,491,320	124,566.00	2,500,000	111,750.00	45,678,961	1,196,788.77
1888	6,178,855	5,787,527.51	13,886	277,720.00	2,886,616	288,681.60	.....	.....	44,567,157	1,203,313.23
1889	7,147,651	6,656,254.65	24,975	499,500.00	2,060,792	206,079.20	2,359,540	89,662.52	59,421,730	1,378,584.13
1890	8,165,586	8,492,209.44	33,851	677,020 00	956,708	76,536.64	5,082,800	203,312.00	63,181,817	1,895,454.51
1891	8,015,223	8,759,206.59	36,160	723,200.00	1,836,060	100,983.30	6,170,000	246,800.00	80,356,528	2,410,695.84
1892	8,969,656	7,792,388.65	38,182	763,640.00	1,822,616	91,130.80	.....	.....	91,117,107	2,505,720.42
1893	7,107,503	5,233,965.20	54,072	1,081,440.00	1,062,467	69,060.35	.....	.....	70,097,079	1,542,135.73
1894	6,659,798	4,193,674.80	56,427	1,128,540.00	1,066,160	53,308.00	202,500	62,977.50	55,551,663	888,826.60
1895	8,223,804	5,366,032.11	65,418	1,308,360.00	2,164,757	151,532.99	.....	.....	70,782,249	1,486,427.22
1896	8,728,705	5,843,868.00	93,896	1,877,920.00	3,561,860	267,139.50	.....	.....	73,430,060	1,358,456.11
1897	7,561,971	4,522,058.65	80,467	1,609,340.00	3,920,966	313,677.28	.....	.....	77,387,570	1,818,607.89
1898	7,544,722	4,403,854.23	104,900	2,098,000.00	5,333,638	426,691.04	.....	.....	90,346,100	2,348,998.60
1899	7,736,248	4,612,351.05	173,266	3,465,320.00	9,968,000	1,246,000.00	.....	.....	90,062,300	2,701,869.00
1900	10,196,818	6,248,610.07	206,261	4,125,220.00	18,354,726	2,514,597.46	.....	.....	96,088,100	3,123,863.25
Total	157,213,492	$137,233,851.27	1,098,463	$21,963,723.00	61,126,363	$6,275,290.61	43,268,561	$1,964,315.71	1,468,194,800	$36,957,890.64

Earlier Bullion Product,

As given by Prof. Marcus E. Jones.

1869	$200,000	1871	$3,000,000	1873	$4,524,492	1875	$7,000,000
1870	1,300,000	1872	2,547,017	1874	5,737,100	1876	6,000,000

Total Earlier Bullion Product $30,308,509.00

Recapitulation.

157,213,492 ounces silver, value	$137,233,851.27	1,468,194,800 pounds unrefined lead, value	$36,957,890.64
1,098,463 ounces gold, value	21,963,723.00	Value of bullion product, 1869 to 1876, inclusive	30,308,509.00
61,126,363 pounds copper, value	6,275,290.61		
43,268,561 pounds refined lead, value	1,964,315.71	Grand total product to January 1, 1901	$234,703,580.23

WELLS, FARGO & CO.'S ANNUAL STATEMENT OF THE MINERAL PRODUCT OF UTAH FOR 1900.

	Pounds of Copper.	Pounds of Lead, unrefined.	Ounces of Silver in bars.	Ounces of Silver in base bullion and ores.	Ounces Gold in bars.	Ounces Gold in base bullion and ores.
Smelters in Utah	12,495,913	47,958,900	.....	4,740,184	.....	50,332
Mercur District	.....	.....	139	.....	97,103	.....
Ores Shipped Out of the State—						
Park City District	561,001	46,900,000	200,000	3,993,684	450	9,148
Tintic District	3,223,732	406,000	68,016	1,049,613	94	36,294
Other Districts (part of Tintic)	2,074,080	823,200	32,727	112,455	6,283	6,557
Total	18,354,726	96,088,100	300,882	9,895,936	103,930	102,331

RECAPITULATION.

18,354,726 pounds copper at 13 70-100 cents per pound	$2,514,597.46
96,088,100 pounds unrefined lead at $65 per ton	3,122,863.25
10,196,818 ounces fine silver at $0.6128 per ounce	6,248,610.07
206,261 ounces fine gold at $20 per ounce	4,125,220.00
Total export value	$16,011,290.78

Computing the gold and silver at their mint valuation, and other metals at their value at the seaboard, it would increase the value of the product to $17,686,462.38.

The value of the foregoing table as a measure of the march of mining in Utah is very great. It marks, year by year, the steady advance of our mineral output, and for the accuracy of the figures the great banking-house of Wells, Fargo & Co. stands sponsor. Attention is particularly directed to the indisputable evidence this table gives of the advance of the copper and gold production since 1897. As against 80,467 ounces of gold produced in 1897, the year 1900 comes forward with 206,261 ounces, an advance of over 150 per cent. The copper showing for 1897 was 3,920,966 pounds, of the value of $313,677.28. In 1900 this product increased to 18,354,726 pounds, having a value of $2,514,597.46, about 350 per cent. advance in pounds, and nearly 700 per cent. advance in value. The silver product advanced during the same period from 7,561,971 ounces to 10,196,818 ounces.

Much gratification is felt over the prominent place Utah is taking as a producer of the red metal. Within the past three years enormous bodies of copper-bearing ores have been opened in some of the older camps, notably in Bingham, where Boston capital has been particularly interested in their development.

While, perhaps, not properly classified at this place, it is well to present here a summary of Utah products for the last year of the century in the following table, published in the New Year's (1901) edition of the Salt Lake Herald:

SUMMARY OF UTAH PRODUCTS IN 1900.

Gold	$4,125,220
Silver	6,248,610
Lead	3,122,863
Copper	2,514,597
Sheep and Wool	4,000,000
Cattle, Horses and Hogs	3,500,000
Wheat	1,848,553
Dairy Products	2,000,000
Fruit	1,000,000
Other Farm Products	5,868,800
Coal	3,140,040
Manufactures	9,000,000
Beet Sugar	1,000,000
Asphaltum	300,000
Miscellaneous	1,500,000
Total	$49,168,683

THE MINING COUNTIES.

Perhaps there is no county in the State of Utah wherein some mining is not carried on, as the whole State may be said to be a mineral field. The counties of Summit, Tooele, Salt Lake, Wasatch, Uintah, Utah, Juab, Millard, Beaver, Piute, Iron, Washington, Box Elder, Cache and San Juan, while having both agricultural and mineral resources, are prominent mining counties, and within them are located the leading producers of the State.

Indications of mineral are not wanting in every portion of Utah where there are mountains, and valuable mineral deposits are being found in every portion of the State. Ores of good quality are known to exist in many of the isolated ridges which fringe the desert in Western Utah, and mining in that section is taking on a new impetus on account of the probable early construction of a railroad to Southern California. For convenience in making up this account, the several counties of the State wherein mining is a leading industry will be discussed separately in the order of their importance.

SUMMIT COUNTY lies immediately east of Salt Lake County, and is almost entirely devoted to mining.

The mining field begins near the heads of the Cottonwoods and the American Fork, almost within sight of Salt Lake City, and extends ten miles eastward over the first ridge of the Wasatch, where it is distributed by the winding mountain crests which culminate in that vicinity over four districts, the most important of which are the Uintah and Blue Ledge. These are in reality but one district, being divided only by a county line to which the mineral veins pay no attention. Park City, a town of 3,759 inhabitants, connected with Salt Lake by the Union Pacific Railroad, is the principal town. It has an excellent city government, churches of various denominations, public, free and private schools, various benevolent and other societies, many large business houses, good banks and an excellent water-works system, largely supplied with water flowing from the leading mines; it is lighted by electricity, is the location of many of the great mineral mills of the State, and is in every way a bustling, busy and prosperous town. Its altitude is about 7500 feet, and, while in many respects a typical mining camp, it is free from the disorder and "hurrah" which usually characterizes mining towns.

The principal mines in this county are the Ontario, Great Drain Tunnel, Daily Mine, Daily West, Silver King, Glencoe, Woodside, Lucky Bill, Creole, Putnam, Comstock, Crescent, Alliance and Anchor.

Summit County has for many years been one of the most important portions of Utah's mineral field. There mining is conducted in the most practical and scientific way, and as the ore bodies show no sign of exhaustion, and new and valuable ones are being opened every year, the county will probably retain its lead for a long time to come.

JUAB COUNTY.—In every part of this county mining is conducted, but the principal production is in and about the mining camp of Tintic, which, in the possession of rich mines and in the amount of its annual output ranks next to Park City as a mining camp. In Tintic are located many of the great mines which have given fame to the State, among which may be named the Centennial-Eureka, Eureka Hill, Bullion-Beck, Champion, Gemini, Keystone, Ajax, Godiva, Mammoth, Lower Mammoth, Grand Central and others.

A correspondent of a Salt Lake paper gives the following excellent description of the country:

"The mountain mass in the Tintic District is composed almost wholly of folded-up strata of limestone, which is also the mineral-producing formation of the region. A thick bed of quartzite extends along the slope of the range, but the higher central portion of this has been removed by erosion, leaving a broad belt of the underlying limestone exposed.

"North of Eureka Gulch some eruptive rock (probably trachyte) is also found, covering a limited area, and one prominent peak is composed of this material. But this formation is not very extensive, and, I believe, is the remnant of a once intrusive sheet (lacolite) between the limestone and quartzite.

"Crossing the range then from west to east along the transverse ridge, of which Eureka Hill forms the central and highest point, and which furnishes an excellent cross-section, we pass over a continuous limestone formation for a distance of a mile or more of strata standing nearly vertical.

"This distance represents a number of folds, or rather, I think, three anticlinals and two synclinal folds, for I doubt if the limestone strata is more than 1,000 feet thick, although, during my short stay, I could not enter into details of accurate measurement.

"The ore deposits are found in vertical sheets or veins, very irregular, faulted, and 'pockety,' as limestone deposits always are, yet following the strata of the rock, and consequently have a strike of nearly north and south, and probably a very slight general dip toward the east.

"These limestones are highly crystalline and very hard, ranging in color from a grayish white to a dark blue, the latter greatly predominating. For lack of lithological data and proper time to investigate, I am not prepared to give their geological position, but should judge them to be very old, and probably belonging to the lower carboniferous, or even older.

"I had been told that the ore deposits of Tintic are identical with those of Leadville, Colo., with which I am quite familiar, and this is to some extent true; but they differ in some essentials, the most important of which, to the practical miner and prospector, is their mode of occurrence.

"The deposits, as before stated, being vertical, tunneling would be in order, but the country, being quite flat, does not permit of this to good advantage, and the most common way of prospecting therefor is by shaft and cross-cuts. But as there is no outcrop, it is not easy to determine where to sink in order to obtain good results.

"Two theories may be advanced regarding the manner in which these ore deposits were made, either of which, or both combined, would probably have given the existing results:

"First. The ore may have been deposited in and along the top of the limestone floor before the disturbance, and carried along, taking its proper place in the folded-up strata, probably being altered to some extent later.

"Secondly. The deposits may have been made altogether after the disturbance, as a fault-fissure, by far the most common form of vein. In the first case, we may expect the ore to continue to the bottom of the limestone, and there break off abruptly. In the second, it may continue downward far beyond the limestone and into the underlying rocks.

"In either case, I have little doubt that the ore deposits follow along or close by the contact plane of the synclinal fold, and this would tend to prove the first theory, but it does not disprove the second, as the folding plane would most likely also be the plane of faulting and rupture and consequent mineral secretion.

"It is not easy to distinguish on the surface the plane of contact between the various folds, but to the practical and careful observer this can be done, and may greatly assist prospecting.

"During the long period this enormous limestone bed was being deposited on the bottom of the sea the conditions varied slightly; hence the composition of material also varied from the bottom to the top, and especially so in the amount of silicious matter it contains, some being highly silicious, of a light color, and very hard, while the bulk is more soft, darker in color, and contains less silica, and these conditions still exist.

A thin layer of shale was also formed toward the top, which can be seen in various places, and may be used as a landmark.

"The ore deposits are, as a rule, large, easily mined, and of a high grade. * * * * * * The mines are not troubled with water, but rather with the lack of it, for even those mines which have reached a depth of nearly a thousand feet have none excepting what is brough there by human effort and ingenuity. Most of the water, for all kinds of uses, is derived from springs.

"As the population of Eureka and the various other camps is steadily increasing, and more mines are being opened every year, the question of water supply cannot be far distant, for, when the section receives the attention it surely merits, the few local springs will be far inadequate. But Utah Lake, being distant only a few miles, may be counted upon to supply the means; the end can be easily found."

Another observer, namely, Mr. J. E. Rockwell of Pueblo, Colo., has the following to say of the Tintic District:

"I spent five days there. I found a lime belt, well defined, standing on edge, from half a mile to three miles in width, and many miles in extent. The line of porphyry on the east and the quartzite on the west is clearly marked, and between these two great walls there is a vast lime zone. It is best illustrated by a book standing on its back, with its pages turned up. Between these leaves extend, in a course generally north, 15 degrees east, great channels of ore. In sinking down between any of these layers of lime, one is liable to find ore, and when found the bodies are extensive—sometimes breaking off from one layer of lime into the adjacent, but always at some place connected so as to be easily followed. Necessarily, this ore, through leaching, would be found at some depth from the surface, and for this reason it is not a poor man's camp. But it possesses the advantage of great certainty of finding ores to one who is able to sink to the requisite depth. * * * It has been demonstrated that the quality of ore is high-grade and continues in depth. It is typically a high-grade camp, although quantities of low-grade ore are necessarily found, which some day will be worked.

"The mountains surrounding the place are easy of access, and there is every facility for mining operations, which can only be carried on by companies and men of means.

"It is assured that vast wealth is stored in this belt, only awaiting development."

EUREKA, sometimes called Tintic, having a population of 2,335, is the mining town, and is well supplied with business houses, hotels, saloons and other business institutions. The town is very much scattered, being built upon the surface of several mining properties, and is at an altitude of about 6,500 feet. The output of the district, measured in money, is something enormous, and its shipping mines, many of them, have attained to national fame. One hundred and fifty thousand tons were marketed by the following

leading properties during 1900: The Centennial-Eureka, Grand Central, Mammoth, Gemini, Godiva, Carisa, Ajax, Humbug, May Day and the two Swanseas. A large additional tonnage may be estimated as coming from lesser properties, of which there are many. Tintic is a dry camp; the mines are entirely free from water, and the supply for domestic and milling purposes is brought in and distributed by pipe lines. This fact has been and continues to be one of the most remarkable features of the region. While in other camps at corresponding depths mine owners are expending fortunes in contending with water, here he is required to reach into his pocket and pay for every drop he consumes in kitchen and mill. All the riches so far disclosed are in country as dry as a bone, and no one is able to even approximate the level at which water will be encountered.

Other less important but valuable properties in this remarkable district, of which detailed notice cannot, for lack of space, be given here, are the Snowflake, Carisa, Spy, Star Consolidated, Dana, Sioux and Utah, Humbug and Uncle Sam, Yankee Consolidated and May Day, Emerald, Sunbeam, Four Aces, Showers Consolidated, Illinois, Shoebridge Bonanza, the Joe Bowers and others.

The characteristics of the Tintic District are great ore bodies, entire freedom from mine water, low altitude, the absence of snows, the possession of many thoroughly equipped mills and the large per cent. of gold and copper present in the ores. This latter characteristic has enabled many of the mines to work profitably during all the period of silver depression, as the gold and copper extracted was sufficient to give the ores a market value high enough to justify their mining.

Millions have been extracted from the earth at Tintic, and there are millions of tons of ore yet in sight, awaiting the pick and blast. There can be no question that the productiveness of the camp will continue for generations to come.

SALT LAKE COUNTY.—As Utah civilization commenced in Salt Lake County, so did Utah mining. The oldest camp in the State is Bingham, situated in the Oquirrh Mountains, about twenty-five miles west and south of Salt Lake City. Mention has been made in this account of the discovery of mines in Bingham, its early history, and of the location of the Old Jordan Mine—the first mineral vein opened in the State.

The Town of Bingham, having a population of 2,989, is scattered along the sides of a winding gulch, from the bottom of which the gold-dust was washed in the "sixties." Bingham makes no pretensions as a business center, being too close to Salt Lake to enjoy anything other than local trade; but it has good hotels and stores, and its business men do a large business with the miners employed in the surrounding mines. For years the town was content with the happiness of possessing lead, silver and gold bearing ores and annually presented a tonnage and bullion showing which earned for it the name of "Old Reliable." However, all the while, down below the deepest workings, were sleeping undisturbed vast bodies of copper ore never dreamed of by the most enthusiastic Binghamite. The discovery of this rich reserve dates from about three years ago, when the owners of the Highland Boy, busy with development for cyaniding values, encountered the copper bodies. Then came the great advance of interest in Utah copper in Boston and the organization of the Utah Consolidated Mining Company and the other great corporations which have since opened mines and built smelters in the district. Bingham is no longer only a lead-silver camp, but has attained a greatness on account of its production of copper which is growing every day as new depths are reached and new zones disclosed.

Speaking of the West Mountain District, by which name the region is known, the Bingham Bulletin says:

"West Mountain District has in its history developed but few sensations calculated to attract the class who are looking for 'something for nothing,'

and who constitute the majority in a boom. It has half a dozen mines, each of which have produced millions, but it was by careful management and able direction that the results were obtained. It has a hundred other properties that are either now in process of outputting forunes or in condition to do so whenever the owners begin operations for production. And there are the idle ones, among which are, without a doubt, some that will prove as good as the best."

Bingham is essentially a "poor man's camp," not in the sense that it is a haven for a man without means, but as the term is commonly used and understood in mining countries. Very many of the claims now showing mineral were opened and made their first shipments on grub stakes. There are many idle properties in the camp, owned by persons of small means, which, without furher development, are capable of outputting a fair tonnage per day. Many of these mines, with the assistance of capital could easily increase their output to ten, twenty and fifty tons per day, as the case might be, and could be made a source of profit. One of the characteristics of the camp is the permanency of the veins. It is said that no prospect in Bingham has ever lost its mineral by petering out.

Mr. A. F. Holden, manager of the Old Jordan and South Galena mines, speaking of the geology of the district, says in a recent article:

"The mineralization of the West Mountain Mining District is of two classes: First, the veins lying conformably to the strata; second, the true fissure veins, that cut the strata at different angles.

"The first class contains most of the principal mines in Bingham, and it is from this class that by far the largest portion of the production has come.

"It is probably safe to say that there has been over five times as much ore taken from the contact veins as there has from the fissures, although the famous Galena and Winnemuck are both on fissures.

"The main mineralization of Bingham is confined to a belt about 1,500 feet wide by four miles long. In this belt are two beds or dolomitic limestone, one about 150 feet, the other about 100 feet thick. Both of these beds are highly mineralized. On the first of these are the famous Brooklyn, Old Telegraph, Spanish, Utah, Old Jordan and Stewart No. 1 mines, named in order from east to west. On the other belt are the somewhat less famous Richmond, Dalton, Lead Mine, Hamlin, Commercial and Stewart No. 2, named in a similar way.

"Above and below these main mineralized belts are narrower beds of calcareous shale and limestone, some of which are mineral bearing. On these smaller beds are situated the Lark, Sampson, Yosemite Nos. 1 and 2, the Highland, Petro, York and many others. Among the mines located on true fissures are the Northern Chief, Bully Boy, Live Pine, Galena, Steamboat, Last Chance, Nast, Dixon, Winnemuck and others. These are all on fissures that cut the country approximately at right angles to line of upheaval.

"The eruptive rocks found in Bingham Cañon and the immmediate vicinity are mainly classed under the very cumbersome and weighty scientific name of augtitic-biotite quartz porphyrite, or, in miners' parlance, simply 'porphyrite.' These eruptive rocks have played a most important part in the mineralization of the district. Taken as a whole, the largest ore bodies in the bedded veins occur near large masses of porphyry, while the richest and largest ore bodies on the fissures occur right in the porphyry.

"The fissure veins are younger than the bedded or contact veins, and also younger than the porphyries. This is shown in many of the mines located on the fissures, some of which have been traced through and across the big bedded veins. In every case the fissures fault the bedded veins, cutting off the ore and vein matter in the beds, often leaving very brilliant 'slick and slides.'

"As to the source of the mineralization in the West Mountain Mining District, little can be said, save alone that it came from the depths. The lateral secretion advocates would have little consolation in visiting Bingham Cañon. The vast and unusually general mineralization could not have come from the porphyries, as is claimed by the lateral secretion theorist, as it is a question whether the mineral in the big veins does not exceed in amount the porphyry that lies near it. This is, of course, not including the tremendous porphyry masses that divide Bingham, Butterfield and Tooele cañons. But the mineralization could not have come from that source, as a microscopical examination of that rock shows it to be practicaly unaltered, proving conclusively that it has been subjected to no extended leaching.

"As to the depth to which mineralization continues, we have to show a section from the top of No-You-Don't Hill, the discovery point of the Old Telegraph Mine, down to the 1,500-foot level of the Brooklyn, a total distance of over 2,500 feet. Throughout that entire distance the mineralization is continuous, and throughout that entire distance marketable ore has been taken. Further, there is ore going below the 1,500-foot level of the Brooklyn in large quantities. Taken as a whole, there has been no diminution of mineralization for this entire distance, nor has there been any indication of any change in the character or grade of the ore since the sulphide zone was reached.

"There can be no reasonable doubt that the present grade of ore will be found in undiminished quantity as far down as miners find it possible to work. Few people realize the enormous quantity of low-grade ore that is exposed in the bedded veins. The Old Jordan Telegraph vein, as the largest lime zone is called, is a wider vein than the famous Anaconda of Butte. There are stopes in this vein still open that are twice as thick as any stope ever opened in Leadville, Colo. The fissures, too, show a strength of mineralization second only to the famous Ontario and Daly fissures. There are levels nearly a mile in length on one of the fissures in this camp that show marketable ore for practically the entire distance."

As a lead camp it is now the greatest in the State. The largest gold nugget ever found in Utah was discovered there by Dan Clays about 1869, and many of the mines are distinctly gold mines, but gold, silver and lead are associated in most of the properties. The Interior Deparment at Washington completed in 1900 a survey of the camp. This will be distributed in the autumn of 1901, and promises to be of much interest to the miner and student.

Electrical energy is now conveyed to Bingham by one of the big companies in the Salt Lake Valley, and the power thus secured is of great value in the treatment of ores by electrical methods, and effects a great saving to the miners and mine owners of the district in displacing fuel for the creation of power.

The number of important mines in this district is so great that no attempt will be made to discuss them severally. Reference has been made to a few of the principal properties in order that an idea may be had of the character and value of the ore bodies. Bingham has never abated her mineral production, and will continue for a long time to be one of the leading camps of the State. The camp has good railroad facilities, and is convenient to the smelters in the Salt Lake Valley.

ALTA.—This region lies in the heart of the Wasatch Mountains, at an elevation of 8,500 feet above the level of the sea. In early days the camp was so prosperous that a railroad was built to Sandy, a point in the valley eighteen miles distant. Steam as a motive power was used a portion of the distance; the remainder of the distance mules were employed to draw up the cars, which, when loaded, were returned a portion of the way by gravity. The region embraces all of the glacial basins which head in the heart of the mountains around Clayton's Peak. There are included within it the mining districts of Big Cottonwood, Little Cottonwood, American Fork and Draper-

ville. The mineral deposits were first discovered by General Connor in 1864. There are some 6,000 mining claims recorded in this region, and the ores are chiefly lead and silver, although considerable quantities of gold have been taken out.

THE EMMA MINE, famous on both sides of the Atlantic, is located here. It was discovered in 1868, and sold later in England for several million dollars. Almost equally famous is

THE FLAGSTAFF MINE, which is on the same general vein as the Emma. The ore is almost identical with that of the Emma, and occurs in the same way. The production of this mine in he past has been very great. Another well-known property at Alta is

THE MAXFIELD; for years shipped ores regularly, and was operated without machinery. Of such famous mines as the Emma, Flagstaff, Joab Lawrence, Miller, Prince of Wales, Reed & Benson, etc., much of interest could be written if space did not forbid. Work has never ceased altogether, however, although it has ceased on hundreds of prospects and on scores of mines. This is due to the same incidents that everywhere embarrass mining—lack of means being the principal. It takes a mine to make a mine, Spaniards say, and it is true. Some of our greatest mines would now be dead and unknown had they not at an early stage passed into the hands of men of ample means; men able to put in a good deal of money before they took any out. There ought to be 200 producing mines around Alta, and some day there will be. Some accidental strike will call attention to this mining ground, so accessible from the valley; men will again flock in there; work will be resumed on properties partially developed by men full of pluck and with means. Fifty mines might be named in the district that need nothing but work and exploitation to become profitable producers. And there are four times fifty more, probably equally meritorious, which have never been worked enough to be known.

The revival of mining which has taken place all over Utah within the past two years has been particularly manifest in the Cottonwoods and the surrounding mineral region, and the districts of the region are commencing to take on some of the life and bustle which characterized them in the heyday of their prosperity years ago. The accessibility from the valley of these mines and the facilities which are furnished for the treatment of ores by near-by smelters make this region particularly attractive to the miner and prospector. It has been the history of mining that but few mining camps reach their greatest production during the era of first discoveries. The salvation of their ores is frequently dependent, like the salvation of the soul, upon a new birth. Leadville has passed through three seasons of activity, each resulting from the discovery of the precious metals in new form. Aspen had her second coming as the result of unexpected discoveries on Aspen Mountain. Cripple Creek was first given to fame as Mount Pisgah, and was abandoned and almost forgotten when lucky finds built Cripple Creek on the site of the old workings. It was so with Creede, and it will probably be so with the region around Alta and "The Cottonwoods." The forgotten camps of Nevada are springing into new life under the stimulus of the hope of cheap transportation and the certainty of the application to their ores of new milling methods. The Alta region has produced millions of dollars in the past, and that millions more are buried in the massive sides of the Wasatch, within sight of the old mines, is conceded. Perhaps, within this century, there will be another boom at Alta, and the old camp will have greater prosperity than ever before.

TOOELE COUNTY.—Stockton and Ophir are among the oldest camps of the State. The districts in which they are situated were organized in the early days of Utah mining, and fabulous stories are told of the production of some of their mines. The Hidden Treasure was discovered in 1865, and 28,000 tons of the product of this property once sold for $988,700. The

Chicago was once another great mine. It has over eight miles of openings, and its total production is said to have been over $1,000,000. Another mine with a past production of $1,000,000 is the Mona, which sold in early days for $400,000. The Kearsarge, another old-timer, produced several tons of $10,000 per ton ore, and is credited with a total production of more than $1,000,000. The Great Basin Mine, now called the Honorine, is said to have produced $3,000,000, and many years ago had nearly 12,000 feet of openings. This mine under new management is taking on new life. Recent discoveries of copper-bearing ore in its lower workings indicate that the great bodies of ore in Bingham are continued into this district. There are some 1,200 mining locations in the neighborhood of Ophir and Stockton. Most of these properties, of course, are dormant, and await only the coming of capital for development to become steady producers. This region, like the region around Alta, is destined for a new birth. Its proximity to the mining camp of Mercur, where the cyanide of potassium process is working such wonders in the production of gold, gives promise that the gold-bearing ore bodies of Mercur extend also into this region.

In a westerly direction, and but a few miles distant from Ophir, partly in Tooele County, partly in Utah County, and within three hours' ride of Salt Lake, lies the

Camp Floyd Mining District, of which Mercur, with a population of 2,351, is the central town, has long been familiar to the Utah miner. In the early seventies it was called Lewiston. The great mines of that day were the Sparrowhawk, Carrie Steele and Mormon Chief, which produced large quantities of silver within a brief time and then ran out. Many characters that belong to frontier life were among the early population of Lewiston. Bill Hickman, later known as a "Destroying Angel," had a ranch not far distant, upon which, it is said, the only thing he could raise was water. The late Marcus Daly built a smelter in this gulch when the excitement was at its height, and R. C. Chambers, ex-Senator Hearst and Tom McMasters, some of whom are yet living, were his contemporaries. Then came a time when the gulch was abandoned, and the ruins of Lewiston and the smelter were all that remained to evidence former activity. The silver age of the district was complete, and years were to roll by before the cyanide process was to come and with its magic awaken the camp from its sleep and usher in the age of gold. In that elder day, when Lewiston was a silver camp, gold was known to exist there, but it resisted all processes of treatment until the autumn of 1890, when the cyanide of potassium reduced it to subjection. To this chemical process the world is indebted for the great production of the Transvaal, and to it is due the existence of Mercur camp. The process is a simple one. Even a child can understand it. Given ores in which the gold is deposited in very fine particles, it only remains to crush them to the size of coffee grains, place them in vats and subject them to the cyanide solution. This solution dissolves the gold. Then the solution is filtered through shavings of common zinc, to which the gold adheres. Then the gold and zinc are separated by fire, and that is all there is of it; and there you have the cyanide process.

Two great mines, the Mercur and Golden Gate, now united under the ownership of the Consolidated Mercur Gold Mines Company, and several lesser but productive properties are the attractions of this district. Up to the time of the consolidation the Golden Gate was the property of Captain De La Mar, and although it had many miles of workings through tremendous ore bodies and a mill upon its surface covering ten acres and said to be one of the largest cyanide mills in the world, no whisper of its bullion returns ever reached the public. Adjoining this is the former Mercur Mine, which since 1890, by the payment of $1,481,000 dividends, has raised several men from poverty to easy circumstances. The consolidation mentioned was completed on August 1, 1900, and the new company was capitalized at $5,000,000.

Expert measurements of the ore bodies contained in the allied bonanzas at the time of the consolidation disclosed the presence of 1,500,000 tons of an estimated value of $8 per ton, or a gross valuation of $12,000,000. These ores are extracted, transported, treated and the product refined for less than $3 per ton, thus leaving a net valuation of $5 per ton, or $7,500,000 net, in the consolidated mines. Since the consolidation 143,022 tons have been extracted, containing 39,208 ounces of gold, for which $810,427.36 was received. This represents the gross earnings for five months. The distribution of dividends was begun in October, 1900, and $110,000, the earnings of August and September, was distributed. It is estimated that the development work since consolidation increased the ore in sight to 1,750,000 tons.

The great mill on this property is worthy of discussion. It is believed to be without a rival, either in points of economy or in the exhaustiveness with which the ores are treated. The methods employed are impressively revealed in the evolution of a ton of arsenical ore from the time it reaches the elevated bins, to which it is raised by the electric plant from the mine below, until the refined gold issues from the refinery. The ore passes over belt conveyors into the jaws of enormous rolls. Here it is reduced to a quarter mesh, after which it is passed over Bartlett screens, where the soft is "shunted" out, while the residue moves through fine crushing rolls. It is then carried automatically to the elevators, which raise it to a second storage bin. It is now ready for transmission to the roasters by way of automatic belt conveyors, which dump it into the roasting room, where it is given what is called a "sweat roast" for the elimination of sulphur and arsenic, after which, as an oxydized gold-bearing ore, it is transported to a central storage bin and thence to the leaching department, where it is placed in a tank, with 249 tons besides, and there submitted to the cyanide of potassium solution, where it is robbed of its gold in from four to six days. Here we leave the rock and follow the enriched solution, which is piped into storage tanks, from which it is pumped into tanks, where the gold is precipitated by the addition of zinc-dust. The solution is then agitated by a powerful current of air and allowed to settle. It is then piped through a set of filter presses, in which the values are deposited. Once each month the mud-like product is taken to the refinery. Here the zinc is removed by acids and the residue is dumped into pots, whence it comes as gold bullion, 950 fine, ready for the mints. The impoverished solution is returned by pumps to the place of beginning, re-standardized and put to work anew.

The payroll of this company includes 600 persons, and $50,000 is distributed monthly in wages.

There are other properties of great promise in Mercur, among which are the Sacramento, Sunshine, Overland, Geyser-Marion, Ingot, Songbird and thousands of locations besides, most of which are to become consolidated Mercurs if the hopes of their owners are realized. Numerous mills, great and small, dot the district. An admirable water system traverses the town of Mercur and runs to the principal mines. For the geology of the district the opinion of James E. Spurr, which appears in a Government publication entitled "Economic Geology of the Mercur District," 1894, is offered.

"The Camp Floyd veins are true contacts of lime and porphyry; the mineralization occurred from below, that of the silver vein through an aqueous solution, and that of the gold ledge, at a later period, through gases and vapors; the region of greatest mineralization is the lower point of contact between the second or middle sheet of porphyry and the lime, and immediately below such point of contact; the form or state in which the gold was deposited has not been determined, but it was probably a telluride, as traces of tellurium have been found in the unoxydized ores; in the oxydized ores the gold is probably now in a free or metallic state, but of invisible fineness; the mineralized zone is about 1,000 feet wide and of undetermined length. The opinion is advanced that as greater depth is attained the

character of the ore will change, tellurium will be found, higher values obtained, and smelting will then be the method of treatment."

Prof. H. J. Lane, of London, after two visits to the Camp Floyd District, gives his views in the following language:

"The sedimentary theory, if any maintain such a theory, as I have been informed, is amiss in the extreme. In the first place, if such a theory should be sound, it would be an easy matter for anyone to secure a gold mine who might be fortunate enough to own a claim in the district, by simply doing work sufficient to come in contact with the vein. This would be all that might be necessary to make the owners bonanza kings, and, furthermore, in such a case the vein would be mineralized regular and alike, and would carry values in one place just the same as in another. Consequently, there would have been no choice as to locations in any part of the supposed sedimentary territory, and the thousands of dollars which have been expended in barren locations would have been productive of as many thousands, and every claim would have been a mine, and such a mine in Mercur, I consider, would be a mint.

"My opinion is that the vein in that district is as well defined a contact as I have ever seen, with the exception that it does not lie as far below the surface as most veins of its character, and, for this reason, many have called it a blanket vein, which is in itself an erroneous idea. Every hill in the district has at one time carried its portion of that vein, and would today had it not been scoured away by the action of the elements. Another feature is that the vein is badly faulted, and it is impossible for a claim to have more than one apex within its boundaries, and this idea has been demonstrated in several of the locations, some of which exhibit as many as three apexes. In other words, every fault has its own apex somewhere, and several of these may occur in one location.

"I have seen some useless work done where the vein is evidently faulted or broken, and this I deplore. The Camp Floyd District so much resembles the Johannesburg country, where we have learned where and where not the vein is mineralized, and its source of values, that the country in Mercur looks very natural and familiar to me. It may interest those who are interested in Mercur to know where we find our source of values. In Johannesburg we have a large porphyry dyke cutting the formation from east to west, and it is from the overflow or offshoots from the porphyry that we find our values—that is, in the channels from the porphyry. These channels are or were the channels of hot sulpho-saline and alco-saline water that formerly contained the gold in solution, and this accounts for the mineralization of the lime in some places, which may penetrate to a great depth. This should always occur on the foot-wall and near the porphyry dyke, where, in South Africa, we find our highest values. Where we find our values distant from the dyke it is nearly always on some feeders that ultimately lead to the porphyry.

"My observations in Mercur lead me to the conclusion that the conditions are identical, with the single exception that the values here are greater than in Johannesburg. The slates and talcs are similar, and in the Mercur you have the same oxydized arsenical ores that we have in South Africa. In the basins and near the porphyry is where you may expect to find your greatest values, and care should be taken to avoid leaving the channels. I may say that these channels and the general ore zone is much longer and wider than ours in Johannesburg. The upper part of the vein is porphyry and talc, the ore lying below the porphyry, and in many instances being mineralized to an extent equalling the values in the true ores. These conditions have led some to believe that there are two veins, but this is a mistaken idea, the mineralized porphyry having been accepted as a vein. In other words, the vein and the ore bodies may lie distinct from each other."

Henry Reeves Ellis, of San Francisco, writes as follows of the geological aspect of the district:

"There has been a great deal said in relation to the Camp Floyd Mining District, Utah, concerning the condition of the gold, and also of the deposition of the calcareous quartz vein in which it is found. I had occasion to visit the district in the neighborhood of the town of Mercur for a limited time, and observations made under and above ground in that vicinity led me to the conclusion that the vein is one of replacement, and not of sedimentary deposit, as claimed by some.

"The ore, or ore zone, if I may so call it—as there are two veins separated by a few feet of mineralized lime—is overlaid by a shaly rock, and underlaid by lime, causing a waterwary through the country, through which the alkaline sulphide solution passed carrying the silica and metallic sulphides, depositing them pari passu with the taking into solution a portion of the limestone.

"The fossils, which were enveloped originally in the lime, and now in the ore, which have led some to think that the ore was deposited by sedimentation, are merely evidences of replacement; for, as the lime inclosing the fossils was dissolved, it was immediately replaced by the ore without changing the position of the fossils, and appearing to the eye as though nothing had taken place.

"The vein is of the bedded type, and was formed probably while the country was flat or nearly so, and subsequently tilted, broken and eroded.

"It has been said very often that the gold in the ores of this district was a chloride or some other form soluble in water, the alkalies or their sulphides. This I have proved to be erroneous, and that the gold is chemically uncombined, but is in a metallic state."

Character of Ores.—There are in the Mercur District two distinct classes of ores—oxide and sulphide. The former is particularly adaptable to treatment by the cyanide process; the latter requires some preliminary roasting to enable the process to fully extract the values.

Per Cent. of Value Saved.—The ores so far treated by the cyanide process, except the ores of the former Golden Gate, have been principally the oxide kind, 85 per cent. of the values of which are saved in the mill. This is equal to the percentage saved at Johannesburg, where the ores average about the same in value as they do at Mercur.

One great merit of the cyanide process is its cheapness; the mills are simple, and the reduction materials inexpensive. The cost of mining and milling the ores of the Mercur Mine during the last year, it is believed, did not exceed $2.50, and this included hauling the ores by rail seven miles from the mine to the mill. Where mills are located conveniently to the mines, and the ores are handled by gravity, the entire cost of mining and milling need not exceed $1.75 per ton. This estimate, however, has reference to the oxide ores. Preliminary to cyanide treatment the sulphide ores require roasting, the expense of which per ton is conservatively estimated at 50 cents, so that even the refractory ores can be mined and milled for $2.25 per ton. It will be seen from these figures that five-dollar rock ought to pay.

THE DEEP CREEK COUNTRY.

A large portion of this marvelous and but little-known mineral region, destined, in the near future, to be filled with producing mines and teeming with mining population, is located in Tooele County. Belonging to the Deep Creek country is the portion of Eastern Nevada which received the overflow in the "sixties" from Pioche, Austin, Virginia City and the other great camps of "The Battle-born State." Some thirty different mining districts, each one of which boasts of great mineral bodies, were organized

in this region at the time of the overflow, but owing to the imperfect and expensive milling methods which then prevailed and the absence of railroad facilities no great production has ever characterized the country. One of the best informed mining men in Utah, who examined this country in detail, declares that it contains more mineral than all the rest of Utah combined. Although the portion of this region not in Tooele County is in the State of Nevada, yet its base of supplies will always be Salt Lake City, and its output will always seek Salt Lake for market and treatment; therefore it may be said to be a portion of Utah's mineral domain, and is entitled to consideration in the discussion of her resources. There are probably a thousand mines in the Deep Creek country capable of a greater or less daily output. Among the mines now known to exist in this country are many high-grade properties; but the country may be said to be famed most for a vast number of large veins of low-grade silver and gold ore. The fact is that the whole region is interlaced with these veins, which only await means of cheap transportation to furnish an enormous daily tonnage. The Deep Creek country is today the only virgin mining country in the United States, and when the railroad projects now pending are further underway there will undoubtedly spring up within it many prosperous mining camps. The chief minerals in the region are salt, silver, gold, copper, lead, iron and marble. and the principal districts are the Grantsville, Lakeside, Johnson's Pass, Death Cañon, West Tintic, Omega, Wild Horse, Dugway, Granite Mountain, Detroit, Fish Springs, White Cloud, Glencoe, Antelope Springs, Aurum, Centerville, Schellbourne, Muncey, Piermont, Osceola, Trout Creek, Clifton, Gold Hill, Dutch Mountain, Ferguson Springs, Furber, Spring Creek, Pleasant Valley, Kingsly, Dolly Varden and Sprucemont. Salt Lake is the present outfitting point for this region—the usual route of travel being over the Oregon Short Line, by way of Stockton or Oasis, and across the desert. The latter portion of this journey is particularly difficult, and is the barrier which prevents immigration and the shipment out of ores. At this time no ores are being shipped except those of the highest grade, and no material change in the volume of output need be expected until the railroad is completed. Fish Springs, in this district, is the possessor of the Utah and Galena mines, the former of which has already afforded dividends to the amount of $179,000. The Galena has paid an additional $78,000.

WASATCH COUNTY.—The greater portion of this county is occupied by the Uintah Indian Reservation, only about 200 square miles being under white ownership. A portion of the great mineral belt, on which the Ontario and other famous mines are located, extends from Summit into Wasatch County. The ores differ but little from the ores of Summit County, although copper is more abundant. The principal districts are Snake Creek, having over 200 locations, and Blue Ledge, with about 250 locations. Many of the hydrocarbon deposits peculiar to the northeastern portion of the State are found in this county, and among them the famous mines operated by the Salt Lake Gilsonite Company, from which is produced large quantities of gilsonite and gum asphaltum. This product is transported seventy-five miles to Price Station, from whence it is profitably shipped to the Eastern markets for the manufacture of varnish and for other purposes. Owing to the fact that a large portion of the mineral resources of this county are within the part of it claimed by the Uintah Indians, mining development has made but little progress outside of the districts mentioned. This reservation is known to contain many rich mineral veins which will be worked when the Indian title is extinguished.

UINTAH COUNTY.—This county, like Wasatch, is principally given over to Indian reservations. Gold, silver and lead ores are found in strong veins, and in the Bullionville District is located one of the great copper mines of the West. So vast and rich is this property that Eastern parties have spent considerable money in its development, and the ore has been able to bear a

wagon-haul of 100 miles to the railway for shipment to smelters. Near Fort du Chesne, on the Indian reservation, some of the largest veins of gilsonite and other forms of asphaltum in the State have been found. There is a steadily increasing demand for these hydrocarbon products, and, when the Indian title is extinguished, these valuable deposits will be extensively worked.

Here gilsonite is extensively mined. This product is chiefly used for the manufacture of varnishes and japanning liquids. Heretofore asphaltum for these purposes was imported from Egypt at a cost to the consumer of $250 per ton, but the Utah product has driven the Egyptian from the market. In this county gilsonite is mined and placed on the cars at Price for $40 per ton.

UTAH COUNTY.—A portion of the Camp Floyd (Mercur) District, fully discussed under the head of "Tooele County," and a portion of the Tintic District, treated as part of Juab County, extend into Utah County. These alone are sufficient to make it an important mining region, but, in addition to these productive localities, it has numerous other rich mineral fields. The American Fork District has been an active mining center for many years. Silver and lead are the chief products, but both anthracite and bituminous coal are found, and along the western shores of Utah Lake are large bodies of onyx. This onyx is declared by experts to be superior in diversity of colors and freedom from checks to the imported article. At Thistle and other points sandstone for building purposes is extensively quarried. This stone is of a bluish-gray color, has an even texture, fine grain, and is free from iron and other elements. The regularity of the tint of this stone and the ease with which enormous blocks can be quarried make it especially valuable for the construction of large buildings. Asphaltum, ozocerite, slate, marble, graphite, granite, soda, antimony, cinnabar, sulphur, zinc and copper are among the other mining products of Utah County.

MILLARD COUNTY.—The mineral deposits of this county are but little developed, but lead, sulphur, gold and copper veins exist there, and promise to make the mining interests of the county important in the future. At Cove Creek is found a deposit of sulphur, which in riches and abundance surpasses any other deposit in the known world. The annual output of this property is approximately 1,000 tons. Black onyx, a beautiful finishing material, is also produced in this county, and is being shipped by the carload to the East.

BEAVER COUNTY.—This belongs to the category of unprospected counties. It is known to have general mineral resources, but the most of its product now comes from a district of which the town of Frisco is the center. Lead and silver are at present the principal products, though silica sand, suitable for glassmaking, and white marble of excellent quality are found in abundance. At Sulphurvale are located extensive sulphur mines, owned by the Meyer Brothers of St. Louis. The product of these mines is reduced to marketable condition in works upon the ground. The amount shipped during 1897 was 835 tons. But the greatest mineral possession of Beaver County is the famous Horn Silver Mine at Frisco. This mine ranks among the famous properties of the State. Its output for 1900 was 7,437,536 pounds of concentrates and 5,287,040 pounds of crude ore. At the smelter this tonnage resulted in 3,687,521 pounds of lead, 143,208 ounces of silver, 678,351 pounds of copper and 277 ounces of gold, all of the value of $402,019.39. The dividends paid by the mine to January 1, 1901, aggregate $5,290,000. The property is supplied with a concentrating mill having a capacity of 200 tons per day. The Horn Silver has a history. It was sold by mining men of Utah a quarter of a century ago, through Jay Cooke of New York, for $5,000,000 cash, and has paid, as will be seen from the list of dividend payments made by Utah mines, which appears elsewhere in this book, more than that sum in dividends. Its estimated output to date is about $18,000,000, and there are still such immense bodies of ore exposed in its various levels as to give the impression that it will require many years to work out the mine, which, in fact,

seems to be almost inexhaustible. Other notable properties of the county are the Washington, the properties of the Imperial Copper Company, the Cactus group, the Majestic, the Blackbird and others.

PIUTE COUNTY.—Marysvale is the principal mining district in this county. Discoveries have been made there of veins of high-grade gold ore, and to that circumstance and to the incoming of a new railroad is due the activity now prevailing. Gold was first discovered in this district thirty years ago. At present there are many hundred locations. The best-known property is the Dalton, from which some phenomenally rich ore has been extracted. The ore is free-milling. The Wedge, Bully Boy, Webster and Glen Eyrie are among the promising properties. Other mineral localities in Piute County are the Gold Mountain and the Henry districts, and among the best-known properties are the Copper Belt, Chattanooga, Great Western, Elsie Dean, Deer Trail, Green-Eyed Monster, Crystal, Cascade, Robert E. Lee, Lucky Boy, Treasury Vault, Clyde, Wedge of Gold, Blackbird, Alabama, Copperopolis, Rising Sun, Fraction A, Breckenridge, Old Antelope, Golden Queen and Sevier. The eyes of many prominent mining men are upon this portion of the State, and the Marysvale and surrounding districts will unquestionably soon become scenes of great mining activity.

IRON COUNTY.—This county claims to possess the most extensive iron fields in the world. The iron exists in a belt extending from Union Springs to Iron City, a distance of fifteen miles. This belt has an average width of three miles, and culminates in Iron Mountain, which towers 1,500 feet above the level of the valley. The ore is said to be over 80 per cent. pure iron. Captain Foxwell, in speaking of this deposit, says: "If all the lumber in the world and all the buildings were destroyed, and if all the buildings during the world's existence had to be constructed of iron, there is one mountain in Utah which would furnish enough iron for the world."

This extraordinary statement may or may not be true, but there can be no doubt of the immensity of this iron deposit. It is located upon Clark's proposed road to Southern California, and as there are extensive coking fields in its vicinity, great iron and steel mills will certainly some day utilize its ores. The State Line District, in this county, is now attracting much attention. A silver and gold zone are present in the district, and a prosperous town is building. The principal properties are the Ophir, Creole, Big Fourteen, Gold Belt, Johnnie, Sulphide, Margaret, Willowvale, Utah, Burro and the Sunflower group.

WASHINGTON COUNTY.—Utah's "Dixie's Land" is the most southern county. It has a semi-tropical climate, and enjoys the distinction of possessing the only sandstone silver mines in the world. These mines were discovered by Judge Barbee in the early "sixties," and then, and ever since, have been looked upon as geological anomalies. Judge Barbee found a ledge of common yellow sandstone, apparently barren, and similar in appearance to the sandstone found in the different portions of the United States. History does not record the particular circumstance that induced Judge Barbee to search for silver in the ledge, but it seems he did search for it, and found it, and carried the news of his discovery to the mining camps in Nevada, where he at once became an object of curiosity and ridicule. For several years the Judge was the butt of many jokes, and the silver-sandstone mines of Utah were considered as interesting as the fables of the "golden city" which Coronado is said to have left the land of the Montezumas to search for in the unknown country to the north. But investigation proved Judge Barbee's discovery to be real, and these same sandstone mines have since paid their lucky owners over $1,000,000 in dividends. More than 500 mining locations have been recorded in this county. The ores produced are gold, silver, lead, iron and copper. Production has been heretofore confined to the grade of ore capable of sustaining the expense of long wagon-hauls to railroads, but there are many hundred large veins showing low-grade values which will become

producers as soon as railway facilities are secured for the county. The principal mines on the sandstone ledge are the Leeds and the Barbee and Walker. In the early development of these properties the singular fact was discovered that the depths of the sandstone ledge were filled with the petrified remains of a primitive forest. These petrified trees were found to be very rich in the chloride of silver, and have been mined and milled for many years. Washington County is still in the infancy of its mineral development, but the time is not far distant when its output will be very large. Some of the principal districts are the Bull Valley, Tutsegavit, Copper Mountain and Bentley, and among the principal mines are the Leeds, Barbee and Walker, Mammoth, Black Warrior, Dixie, Savannic, Cunningham, Redbud, Red Cloud, Hoot Owl and Adams. The Adams, Savannic, Redbud, Red Cloud and Hoot Owl mines are copper properties, and produce annually large amounts of this valuable metal.

Enough has been said to establish the greatness of Washington County's mineral wealth. Railroads only are needed to insure the speedy and extensive development of its mineral fields. The county will be discussed further in connection with the agricultural resources of the State.

SAN JUAN COUNTY.—This county covers a vast district in the southeast corner of the State. A large portion of it is included in the reservation of the Navajo Indians. It has been little explored for mineral; but marble, onyx, lime and lithographing stone, and iron, lead and copper ores are known to exist. Some few silver veins have been located, and a year or two ago many hundred fortune-seekers were attracted there by the news of gold discoveries on the San Juan River. The coveted metal was really found in fair quantities, but the expense of conveying water to the placers was too great for the limited means of prospectors, and so but little gold was realized. This county is a wild region, and the least explored of Utah's mineral domain. It is said to furnish an inviting field for the prospector. Some good gold ledges are being opened—notably in the Golden Queen, Dream and Linn and Duckett properties. The vein matter is porphyritic quartz, and in the Golden Queen runs from $5 to $7 per ton—free-milling.

CACHE COUNTY.—The King Mine, in Blacksmith Fork Cañon, thirty miles from Logan, is at present making a most impressive showing. Another well-regarded property is the Copper King. Still others are the Amazon, Blue Bell and Queen of the Hills. The La Plata District, in this county, attracted considerable attention in 1891-92, but no new discoveries are being reported from there.

BOX ELDER COUNTY.—At Sierra Madre Mountain have been discovered silver, lead, copper, iron, antimony, sulphur, graphite and nickel. The veins are of all kinds, fissure blanket and contact, and the geological conditions are similar to those at Alta. The El Dorado group is a prominent one, and other leading properties are the Manilla, American Eagle, Samsons, Red Hand, Aguinaldo, King Solomon, Uwanta, Cashings, Vulture, Mexican, Blue-Eyed Nellie, Ben Hur, Defiance and the Pine Grove group.

The foregoing review of the mining counties will inform the reader of the locality of the larger mineral deposits of Utah, and give him a glimpse into the history of the discovery and output of the leading mines of the State. The limits of this book will not permit mention to be made of every mining district or of mines other than those that now are, or promise soon to be, great producers. Utah contains 86,000 square miles, and within this area almost every metal used by man is found. It is believed no other similar-sized area in the world can show the same diversity of minerals. At the World's Fair, Midwinter Fair and Trans-Mississippi Exposition, Utah's mineral exhibits, prepared with the special purpose of showing the diversity of the State's metal wealth, were the wonder of all beholders, and elicited the highest praise from the several managements.

Utah's mining achievements have been limited to a very small portion of her mineral domain. The tireless prospector is ever searching for new bonanzas, and the full unfoldment of her mining resources will not occur while there remains a single mountain-side which his searching-pick has not investigated. Every day new discoveries are made, and every year adds new districts to the list. With the increase of population there will be a proportionate increase in the mining development until Utah's supremacy over all other mining States will be generally admitted.

AGRICULTURE AND FRUIT-GROWING.

To her mines and miners Utah is indebted for much of her past and present prosperity, and to them she may confidently look for material aid in the future; but to the farmer her greatest debt of gratitude is due. It was his courage and labor that redeemed her barren wastes and made almost every valley of the State a garden spot.

From 1847 to 1870 Utah chiefly depended upon agriculture. During that long period the energies of the people were almost entirely devoted to the reclamation of her arid areas. These areas they quickened into fertility by constructing through them systems of arteries through which the mountain waters were made to circulate, and from which the thirst of the earth was quenched. Many years of patient toil and vast sums of money were expended to perfect this system of irrigation; but its value to the State is incalculable in the guarantee it furnishes, for all time, of the certainty of crops.

In discussing irrigation, elsewhere in this book, the writer has detailed the methods employed, so that nothing further need be said upon that subject. There are four principal reasons why agriculture has been successful in Utah:

First. The people are intelligent and industrious.

Second. Land-holdings are small. This was Brigham Young's idea. Few farms in Utah are larger than forty acres, and there are thousands of farms which do not exceed five or ten acres in size. Under this system all lands are utilized for raising crops, and the farmer is not possessed of more ground than he can make thoroughly productive. Pasturage, for which purpose the Eastern farmer devotes a portion of his farm, is in Utah obtained upon the mountain-sides where farming is impracticable. The valleys of Utah are not so wide but most of the farmers within them can obtain the benefit of these pasturage areas.

Third. The employment of irrigation methods, and the impartiality with which the waters of the State are divided among the people. Conflicts between individuals over the distribution of water seldom occurs. Water users always recognize the rights and necessities of their neighbors, and divert from the canals no more than their just proportion of the water.

Fourth. The presence of a home market for most of the products of the soil. By home market is meant not only the demand from Utah, but from the surrounding mining States. Much of the flour made from Utah wheat is consumed in Idaho and Montana, and the potatoes and fruits of Utah find ready sale throughout the inter-mountain region.

There are no farmers in the United States more prosperous than the farmers of Utah. Most of them have snug sums laid aside for a rainy day, and all of them have comfortable homes, improved farming machinery and well-graded stock. The varying altitudes of the State permits the raising of a diversity of crops. In Cache, the extreme northern county, the hardier grains, vegetables and fruits are grown. In Box Elder County, next to Cache on the south, strawberries and all kinds of small and tree fruits thrive exceedingly well, and the people of this county derive enormous annual re-

turns from their orchards and vines. Southward; through Weber, Salt Lake, Utah, Sanpete and Sevier counties, all fruits, grains and vegetables common to the temperate zone are abundantly produced. Washington is the extreme southern county, and has a semi-tropical climate. This region is the "Dixie" of Utah, and almonds, figs, pomegranates and cotton are extensively cultivated. In this county both soil and climate contribute to the successful growing of wine grapes, and the wine made there has long been famous. The cotton crop of Washington County is increasing yearly. The grade of the cotton is equal to any produced in America, and the crop is sufficient to maintain a cotton mill, which manufactures a large amount of batting and fabrics every year.

Utah is a mountainous region, but the ranges are broken, and the mountains rise abruptly. At the base of every mountain there is a valley, and these valleys, winding through the broken ranges, are the agricultural areas of the State. Every county in the State has more or less agricultural land. The writer has given heretofore a list of the counties wherein mining is the prominent industry. The counties of Cache, Box Elder, Weber, Morgan, Davis, Salt Lake, Utah, Sanpete, Sevier, Piute, Millard, Beaver, Iron, Cane, Garfield, Grand, Toole, Juab and Washington, in each of which more or less mining is conducted, are here classified as agricultural counties. The largest and most productive valleys, stated in the order they occur from north to south, are the Cache, Weber, Salt Lake, Utah, Sanpete and Sevier. These valleys were once portions of the bed of old Lake Bonneville, of which no remnant now remains except the Great Salt Lake. Seen from their surrounding mountain-sides, they present pictures of pastoral beauty, such as the world does not elsewhere produce. From their center to their extreme limits they are checkered with farms and tinted with colors varying from the deep green of the growing alfalfa to the golden hues of ripening grain. Within a radius of fifty miles of the Great Salt Lake the influence of the lake upon the fruit produced is noticeable. The luscious character of these fruits is said to be due to the lake's agency. The Salt Lake peach is particularly affected by these inflences, and for twenty-five years has been known far and wide for its delicate flavor and perfect development.

Utah produced in 1899 in hay a tonnage of two and one-half tons per acre, a higher tonnage than any other State in the Union, with one exception. During the past ten years 50,000 acres have been added to the wheat-growing area, 180,505 acres being devoted to wheat in 1899. The average yield was 20.61 bushels per acre.

THE AGRICULTURAL COUNTIES.

CACHE COUNTY.

Population (census 1900)		18,139
Number of farms		3,842
Cultivated area (acres)		73,057
Irrigated area "		38,430
Unimproved area "		34,091
Average yield per acre (bushels)	wheat	19.2
" " " " "	corn	20.5
" " " " "	oats	39.6
" " " " "	barley	31
" " " " "	rye	10.6
" " " " "	potatoes	149.1
" " " " (tons)	lucerne	3.1
" " " " "	hay	1.5
Assessed valuation, 1900		$5,243,976

Logan City, with a population of 5,451, is the county seat of Cache County. Since 1890 it has increased 886 in population. The city is situated on the line of the Oregon Short Line Railway in one of the most picturesque portions of the beautiful valley, of which it is the trade, financial, social and

educational center. It is a thriving little city, and has the municipal conveniences of water and electric lights. Much wealth is centered there, and there are many large mercantile institutions, with banks, good schools, churches, fine homes, substantial business blocks, well-kept streets and all the other evidences of thrift. Here is located the State Agricultural College and the Brigham Young College, the attendance of which is drawn from all portions of the State. The Agricultural College has thirty-two professors, all of whom are agreed that a broad education, not a limited or superficial one, shall be given all who take a complete college course. The buildings of these institutions are pretentious in construction and architecture, and are a credit to the State. One of the great Mormon temples stands upon an eminence overlooking the city, where it can be seen for many miles about. This striking structure is of white stone, and is one of the notable buildings of the State. Of other churches every principal creed is represented. The city is justly proud of a fine opera-house, of its State experimental farm, where agricultural tests valuable to the people of Utah are in constant progress; of its beautiful school buildings, and the efficiency of its school system, and of the large manufacturing industries carried on. During 1900 plans were consummated for the erection of a sugar factory, and ten acres have been selected for its site. The factory will be of the same capacity as the one at Ogden. Estimates have shown the existence of approximately 40,000 acres of sugar-beet lands from which its material may be drawn. The Hercules Power Company is now completing an electrical enterprise which will involve an outlay of $500,000. It has already in operation a plant furnishing 500 horse-power, all of which is utilized in Logan. The purpose now is to increase this horse-power many times. The waters of Logan are used by this company. The primary intention is to supply the local demand for light and power. The remainder will be conveyed to Ogden, Salt Lake and Bingham. The aggregate horse-power of this plant will be 5000. The altitude of Logan is 4,507 feet.

The fruitful character of Cache County will be realized by a comparison with other portions of the State. The county consists of one magnificent valley bordered by high mountains, which are well timbered and snow-crowned throughout the greater part of the year. From the cañons flow generous streams, which give to the whole valley an abundance of water, so that the people are thrifty and well-to-do. Every few miles there is a pleasant town or village, with a few stores and some industrial concerns; but the capital city, Logan, has real commercial importance, and is the metropolis of Northern Utah. The general aspect of the county is alpine-pastoral, and excites the admiration of all who love beautiful scenery. Six bounteous streams cross the county from east to west, while hundreds of natural springs rise in all parts of the valley. Several hundred flowing wells add to the water supply for market gardening. Wheat, rye, oats, corn and potatoes can be raised in this county without irrigation with better results than in any other part of Utah. Seepage has done much to increase the cultivable area, irrigation on the bench lands having rendered the lower lands moist. Wheat yields well, and the hay crop is astonishingly great, while alfalfa flourishes luxuriantly. Potatoes and other vegetables yield large crops, and are not to be excelled in quality by any in the United States. Fruits, including apples, pears, plums, grapes, strawberries, raspberries, etc., are raised in all parts with profit and with very little care. Considering the fruitfulness of the soil, cultivated land is to be purchased very reasonably—usually not over $50 per acre. The winters are rigorous, and the summers are delightful. Severe winds are unknown. Altogether Cache County is a most attractive district, the climate being superb and the scenery on every side full of beauty. The neighboring cañons are as grand as any in the State, and mountain streams afford excellent trout fishing.

There are many thriving settlements in Cache County, those having the largest population being Hyrum, 1,652; Providence, 1,022; Richmond, 1,111; Lewiston, 955; Paradise, 695; Newton, 672; Mendon, 533; Hyde Park, 619; Clarkston, 475.

BOX ELDER COUNTY.

Population (census 1900)		10,009
Number of farms		799
Cultivated area (acres)		23,751
Irrigated area "		10,730
Unimproved area "		415,345
Average yield per acre (bushels)	wheat	12.5
" " " " "	corn	19.1
" " " " "	oats	32.9
" " " " "	barley	15.1
" " " " "	rye	8.5
" " " " "	potatoes	183.7
" " " " (tons)	lucerne	2.4
" " " " "	hay	2.9
Assessed valuation, 1900		$4,713,595

Every cereal known to Western commerce is successfully grown, the yield being very large.

Brigham City is the county seat, having a population of 2,859, dependent for its commercial prosperity upon the great fruit and agricultural products of the county and the freight from the adjoining mines. The fruit season is a busy one, shipments being made from there to all portions of the West. It is a pretty city, well governed, with a beautiful tabernacle and many pretentious business structures, within which all the usual forms of business are conducted. The lesser towns of Box Elder County are Corinne, with a population of 463; Rawlins, 454; Sunset, 369; West Portage, 513; Willard, 580; Collinston, 340.

The county is one of the most fertile areas of the State, and is especially adapted to fruit-growing. It offers greater inducements for new settlers than any other county in the State. The great Bear River Canal has been completed at an expense of over $2,000,000, and furnishes an adequate irrigating system. Commencing in the great Bear River Cañon and running through the Bear River Valley, the canal extends some 150 miles through as fine a tract of agricultural land as can be found in America. The country would undoubtedly have been settled years ago had it not been for the enormous expense of establishing such a gigantic irrigating scheme. The land adjoins the famous fruit-raising cities of Brigham City, Deweyville, Willard, and Honeyville on the line of the Oregon Short Line.

The Bear River Valley covers 150,000 acres of the choicest lands in Utah, proper irrigation for which is now assured. Large crops may thus be depended upon yearly, instead of once in two or three years, as in States where the farmer is compelled to depend upon rain. The water supply from the great Bear River is unlimited. The company controls the water, and the farmer is thus assured of an adequate supply of the same at all times. The land is adapted to raising all kinds of fruits, especially peaches, apricots, cherries, plums, strawberries, raspberries and prunes, while wheat, oats, barley and all kinds of roots and garden truck grow splendidly.

In this county considerable attention is also paid to small farming, dairying, cattle and sheep raising. The latter industry is of special importance, and the sale of wool and mutton is one of the great sources of revenue. The western portion of the county is especially adapted for grazing of sheep in the winter, and it is estimated that not less than 100,000 sheep are wintered there annually.

WEBER COUNTY.

Population (census 1900)						25,239
Number of farms						1,175
Cultivated area (acres)						27,942
Irrigated area	"					24,162
Unimproved area	"					33,133
Average yield per acre				(bushels)	wheat	24.5
"	"	"	"	"	corn	25.1
"	"	"	"	"	oats	37.6
"	"	"	"	"	barley	30.3
"	"	"	"	"	rye	11.5
"	"	"	"	"	potatoes	157.5
"	"	"	"	(tons)	lucerne	3.1
"	"	"	"	"	hay	1.8
Assessed valuation, 1900						$10,726,438

Weber County, second in wealth and population in Utah, contains 500 square miles, and is diversified by mountain and valley, affording fine grazing land for horses, cattle and sheep in the mountain districts. The valley lands are among the richest in Utah, and comprise about 200 square miles of the Great Salt Lake Valley, lying between the Wasatch Mountains and the shores of the Great Salt Lake. This area is watered by canals taken from Ogden and Weber rivers, and by other canals supplied from springs rising in the valley. East of the Wasatch Range, and in the eastern part of the county, lies Ogden Valley, six miles wide and twelve miles long, rich and fertile, but as it is much higher than Salt Lake Valley, it is not so well adapted to the raising of fruit. The natural wealth of Weber County may be divided up as follows: Agriculture, horticulture, grazing or stock-raising, mines and mining, and great natural advantages of water-power and favorable location for manufacture.

In agriculture there has been uninterrupted success for forty-five years in the production of wheat, rye, oats, barley, corn, potatoes, cabbage, turnips, carrots, mangel-wurzel, sugar-cane, celery, onions, tomatoes, cucumbers, and every other product of the field or garden. Flax, hemp, timothy hay, blue grass, lucerne, red top and clover are successfully raised.

The growing of sugar-beets has become within the past two years the occupation of many farmers. This is due to the operation at Ogden of a great sugar works, which during the year 1900 ranked second in output to the Lehi mills.

All the fruits common to temperate regions are grown in Weber, and the revenue from orchard, bush and vine is large. Portions of the county are specially adapted to grazing, in that the shelter for stock is adequate and the bunch grass peculiar to the mountain-sides and valley is an excellent feed. The value of the stock interests are represented by millions of dollars. The population of the county is 25,239, of which 16,313 reside in Ogden, the seat of county goernment. Other lesser towns are Huntsville, population 1,022; North Ogden, 850; Plain City, 829; West Weber, 822; Wilson, 650; Hooper, 886.

Ogden City

Is the second city of Utah, and as a commercial, railway, financial, educational and social center is prominent among the cities of the West. Its location is a most beautiful one. The picturesque peaks of the Wasatch and the fertile Salt Lake Valley frame in the city. Through its outskirts flow the waters of the Ogden and Weber rivers to their meeting place, just beyond the limits. All that charms the eye Ogden possesses pre-eminently. Leading into it is Ogden Cañon, the place of its great electric-power plant and its most beautiful drive. This cañon for sublimity of scenery has no rival in Utah.

The founding of Ogden is credited to Capt. James Brown of the Mormon Batallion, who settled on its site in 1849. Its real beginning was when the Union and Central Pacific railroads were joined and trans-continental traffic over those great highways commenced.

Today it is far beyond the experimental stage— a city of schools, churches, important manufactories and wealthy business concerns. Its retail trade reaches into all the neighboring towns, and its wholesalers cover with their agents the intermountain country. Of railroads Ogden has the Union Pacific, Central Pacific, Oregon Short Line and Rio Grande Western and a good union depot. One of the most expensive and effective electric plants in the West, with a capacity to furnish 5,000 electrical horse-power, has for its generating force the waters of Ogden River. This plant is located three miles from the city, and the energy produced is employed in various ways in the city, the surplus being transmitted to Salt Lake.

In the autumn of 1898 began in Ogden the operation of a great sugar factory, representing a total cost of $500,000. Twenty-eight thousand tons of beets were milled during 1900, for which the farmers received $4.25 per ton, and from which 5,800,000 pounds of refined sugar of the total value of $290,000 were turned out.

In the way of educational institutions Ogden has the Weber Stake Academy, the Sacred Heart Academy, St. Joseph's School for Boys, the Intermountain Business College and numerous modern public-school buildings. The school population is 5,000, and many teachers are employed. Nine miles north of the city are excellent hot springs, and the Great Salt Lake furnishes nearby summer bathing.

One of the great advantages enjoyed by Ogden is the residence there of railroad men, whose number is estimated at 1,500. All trans-continental passengers and freight are transferred here, and here are made up the north, east, south and west bound trains.

A leading industry of Ogden and Weber County is the canning of tomatoes and general fruits. There are a number of these canneries, having an aggregate capacity of several hundred thousand cans of fruit and tomatoes per annum.

Of manufacturing institutions there are two foundries, four wagon and carriage factories, a tannery, three sash and door factories, one woolen mill, one box factory, three flour mills, one pressed-brick plant, one pipe and tile works, four brick-yards, one brewery, one vinegar and pickle works, one soap works, one cracker factory and numerous smaller institutions.

The wholesale business of Ogden for 1900 is estimated at $10,800,000. Of banks there are five, concerning which the following figures are given by the Salt Lake Tribune of January 1, 1901: Total capital, $560,000; deposits, $2,849,938.

Efficient telephone and street-railway systems are in operation, and an ample water-works system distributes pure water from an adjoining mountain stream.

Besides all these things Ogden has three enterprising newspapers, one of which is a daily, two first-class hotels, thoroughly modern, a public library, a school for the deaf and blind, two clubs, several lodges of secret societies, the State Industrial School, and churches of almost every denomination. Thus equipped, the thriving little city enters the new century certain of the achievements which always follow the work of the enterprising people of well-situated towns. It is not unreasonable to expect, now that new railroads are coming into the intermountain country and Utah's great development has fairly set in, that Ogden will double its population within the next decade.

MORGAN COUNTY.

Population (census 1900)		2,045
Number of farms		350
Cultivated area (acres)		6,321
Irrigated area "		5,856
Unimproved area "		13,707
Average yield per acre (bushels)	wheat	33
" " " " "	oats	41.8
" " " " "	barley	30.5
" " " " "	potatoes	218.3
" " " " (tons)	lucerne	3
" " " " "	hay	2.1
Assessed valuation, 1900		$803,506

This little county occupies a district through which the Union Pacific Railway passes, between Ogden and Echo. It is extremely mountainous in character, but the Weber Valley, with its several towns, Morgan, Peterson and Croydon, is a delightful relief, and the limited amount of land which there is under cultivation yields good returns. Wheat, oats, barley, potatoes and some small fruit are the principal products. The towns being within easy reach of Ogden and Salt Lake City, the produce of the county is easily marketed at good figures. Cultivated land is worth $75 and more per acre.

Morgan is the county seat.

DAVIS COUNTY.

Population (census 1900)		7,966
Number of farms		879
Cultivated area (acres)		25,347
Irrigated area "		14,407
Unimproved area "		12,123
Average yield per acre (bushels)	wheat	20.7
" " " " "	corn	23.1
" " " " "	oats	37.7
" " " " "	barley	33.6
" " " " "	rye	8
" " " " "	potatoes	158
" " " " (tons)	lucerne	2.4
" " " " "	hay	1.9
Assessed valuation, 1900		$3,559,179

In population and fertility Davis ranks high in the list of Utah counties. It lies along the eastern short of the Great Salt Lake and the western face of the Wasatch Mountains. From its county-seat—Farmington—Salt Lake and Ogden are about equi-distant. Practically all of its 250 square miles are under cultivation, and not under ordinary cultivation, either. It is doubtful whether anywhere else in the irrigated regions of the world farming lands have reached a higher state of development than the lands of this valley. One feature of its topography is Church Island, one of the largest and most interesting of the islands of the Great Salt Lake. Some day this island will be a great summer watering-place, but now it is given up largely to the grazing of cattle. Cultivated land in Davis County is worth as much as $200 an acre. This is due to its great fertility and to the circumstance that the county is the market garden of Salt Lake City. All of the settlements in the county are connected by good roads, as well as by rail, with the Utah capital, and a large portion of the garden products found in the city's markets are raised in Davis County. Marvelous stories are told of the productiveness of single acres. Here is a list of the yield per acre of garden products, with prices of each, averaged for two years:

Market gardening in Bountiful, Davis County, yield per acre and average price for two years:

Lettuce	14,000	heads,	@ $ .02	per	head,	$280.00
Early Cabbage	12,000	"	" .05	"	"	600.00
Early Cauliflower	7,260	"	" .10	"	"	726.00
Onions	600	bu.,	" .75	"	bu.,	450.00
Parsnips	1,800	"	" .25	"	"	450.00
Carrots	1,800	"	" .20	"	"	360.00
Tomatoes	2,250	"	" .40	"	"	900.00
Potatoes	350	"	" .75	"	"	262.50
Large Peas	306	"	" 1.00	"	"	306.00
Small Peas	200	"	" 1.25	"	"	250.00
Green Beans	400	"	" .90	"	"	360.00
Cucumbers	250	"	" .50	"	"	125.00
Asparagus	5,500	lbs.,	" .08	"	lb.,	440.00
Rhubarb	7,000	"	" .01½	"	"	105.00
Corn	2,420	doz.,	" .08	"	doz.,	242.00
Celery	30,000	stalks,	" .03	"	stalk,	90.00
Cantaloupe	1,814	doz.,	" .60	"	doz.,	1,088.40
Watermelons	862	"	" .40	"	"	344.80

Yield per acre and highest market price in the early part of the season:

Lettuce	14,000	heads,	@ $ .02½		$310.00
Cabbage	21,000	"	" .10		120.00
Cauliflower	7,260	"	" .15		1,089.00
Onions	600	bu.,	" 1.50		900.00
Parsnips	1,800	"	" .40		720.00
Carrots	1,800	"	" .25		450.00
Asparagus	5,500	lbs.,	" .12½		687.50
Rhubarb	7,000	"	" .05		350.00
Corn	2,420	doz.,	" .20		484.00
Tomatoes	2,250	bu.,	" 2.00		4,500.00
Celery	30,000	heads,	" .06		1,800.00
Cantaloupe	1,814	doz.,	" 2.00		3,628.00
Watermelons	862	"	" 1.50		1,298.00
Large Peas	300	bu.,	" 1.25		375.00
Small Peas	200	"	" 2.00		400.00
Green Beans	300	"	" 3.00		900.00
Cucumbers	350	"	" 2.00		700.00
Potatoes	350	"	" 2.00		700.00

The above figures were compiled by Ephraim Briggs and Brigham Holbrook of the town of Bountiful.

Of water the supply is ample, being drawn from neighboring streams and springs along the mountain's base. Travelers to and from Salt Lake on the various lines leading to the north have the beautiful spectacle presented by this valley before them for twenty miles of their journey. No more perfect or peaceful pastoral scene can be found anywhere. It suggests to the incomer the beauties of the city beyond, and is the last impression carried away when he departs.

Besides Farmington, the county seat, with a population of 1,050, there are Kaysville, population, 1,183; Bountiful, 1,680, and other smaller settlements. The climate is about the same as that of Salt Lake City. In this county are located the wells which supply natural gas to Salt Lake City, and many manufacturing institutions contribute to the prosperity of the people.

SALT LAKE COUNTY.

Population, exclusive of Salt Lake City, 24,194; inclusive of Salt Lake City, 77,725.

Number of farms		2,195
Cultivated area (acres)		36,708
Irrigated area "		36,683
Unimproved area "		47,492
Average yield per acre (bushels)	wheat	27
" " " " "	corn	28.9
" " " " "	oats	30.6
" " " " "	barley	29.8
" " " " "	rye	14.2
" " " " "	potatoes	150.2
" " " " (tons)	lucerne	3.4
" " " " "	hay	3.7
Assessed valuation, 1900		$38,868,099

Even if Salt Lake County did not enjoy the distinction of possessing the capital city of the State, it would rival the most important of other counties in many ways. The cultivated ground is as fertile as any land in the world. The results of actual cultivation justify this statement. Greater and better crops have never been raised in America than on the farms which lie to the southward of Salt Lake City. This extremely productive region is comparatively limited, and there are large stretches of land on the western portion of the valley which have not yet proven to be so rich. From a scenic point of view the magnificent front of the Wasatch Mountains, as seen overlooking the valley, has been pronounced by great artists like Bierstadt and Moran the finest which our continent affords.

Salt Lake County has an area of only 784 square miles, but it is an empire within itself and a center of interest to the whole State. The annual agricultural yield is valued at about $1,000,000. This county enjoys the distinction of being the first one entered by the Mormon pioneers, and the one in which the first Utah furrow was plowed. It has more manufacturing interests located within its boundaries than all the rest of the intermountain country combined. Although its manufacturing and commercial interests predominate, the agricultural features of the county are by no means insignificant. Over 36,000 acres of land are under irrigation, and an equal amount under cultivation, and, generally speaking, it is in high cultivation. Besides this there are 15,000 acres used for pasture. No valley in all the arid regions surpasses this in its natural facilities for irrigation. The water supply comes from the various streams which issue from the Wasatch Mountains into the valley, and from the Jordan River, which flows from Utah Lake, and the whole area of the eastern side of the valley is one vast network of canals and ditches. The development of this system of irrigation has accumulated moisture in the soil, so that a far larger area is now cultivated than appeared possible in the early history of the valley. It was on the outskirts of Salt Lake City that the climax of wheat production in America was reached, in a yield of over eighty bushels to the acre. The kinds of crops have the greatest acreage in the following order: Lucerne, wheat, hay, barley, potatoes, corn, rye, orchards, beets and vineyards. Other farm products consist of butter, honey, dried fruits, vinegar, cider and wine. The county has large interests in cattle, horses and sheep. The towns and cities outside of Salt Lake are Big Cottonwood, Brighton, Bingham, Mill Creek, Granger, Hunter, North Jordan, Pleasant Green, Sugar House, South Cottonwood, the City of Sandy, South Jordan, Union and West Jordan.

The farms of Salt Lake County are inadequate to the production of products sufficient to supply the demand in Salt Lake City, and Davis and other adjoining counties are drawn upon. This demand guarantees large and quick returns to the farmer for his crops. Salt Lake City, the capital of the State and the county seat of Salt Lake County, will receive extended notice elsewhere in this book.

UTAH COUNTY.

Population (census 1900)		32,456
Number of farms		2,751
Cultivated area (acres) (estimated)		86,535
Irrigated area "		57,397
Unimproved area "		25,037
Average yield per acre (bushels)	wheat	28.1
" " " " "	corn	25.1
" " " " "	oats	37.3
" " " " "	barley	40.4
" " " " "	rye	11
" " " " (tons)	lucerne	2.8
" " " " "	hay	1.6
Assessed valuation, 1900		$10,105,032

This county has increased to its present population of 23,768 in the past ten years. Where there are so many wonderfully rich agricultural areas

as there are in Utah, a description of any one of them is applicable to all. The traveler through Utah, when he enters the Utah Valley, finds it impossible to believe that the State can present elsewhere any more beautiful scene. The famed vale of Chamouni and the beautiful Mohawk Valley are celebrated in song and story. This valley, too, might well engage the pen and the muse. Rimmed about it are the massive, snow-crested peaks of the Wasatch. Almost at its very center, glistening on the bosom of nature, is Utah Lake, around which, across the plain and climbing up the mountainsides, are little farms, divided now by the silver ribbons of irrigating streams and again by rows of tall Lombardy poplars. Scattered everywhere are the homes of husbandmen, hop-vined and shaded. What a scene for artist and poet! What a paradise for the kodaker!

Any extended discussion of the fertility of the soil and the amount and variety of the crops produced would be but a repetition of the discussion of other Utah counties. It is enough to say upon this subject generally that orchard, vineyard and field yield every year handsome tribute, and that the farmers all have competencies and are content.

Sugar-beet culture is a great specialty in this county, for at the town of Lehi there is a great sugar factory, which is the largest in the United States, having a cutting capacity of 1,200 tons of beets each twenty-four hours. This factory made during 1900 11,400,000 pounds of sugar. For every ton of these beets the farmers received $4.50, and the acreage for 1901 will be 10,000. Utah is justly proud of this factory, and the people of the county are indebted in part to it for the high degree of prosperity they enjoy.

Provo is the principal town and the county seat. It has a population of 6,185, and, besides, there are the following important settlements: American Fork, population 2,732; Lehi, 3,033; Payson, 2,636; Pleasant Grove, 2,460; Spanish Fork, 2,735; Springville, 3,422, with numerous other smaller places. These are all prosperous places, with good business houses, banks and numerous manufacturing institutions. All are laid out with broad streets and generous lots, so that breathing space is ample. Every place has its little church and its public school, and no more moral or industrious people than theirs inhabit the earth.

Provo has the State Insane Asylum. It also has the Brigham Young Academy, a great electric-power plant, operated by the waters of the Provo River, a delightful summer resort on the shores of Utah Lake, the Oregon Short Line, a fine system of electric lights and water-works, two or three strong banks, a fine tabernacle, a theater and business houses that would be a credit to a city many times its size. Surround all this with scenery as picturesque as the scenery of the Alps, and nothing is left to be said.

SANPETE COUNTY.

Population (census 1900)		16,313
Number of farms		1,540
Cultivated area (acres)		27,039
Irrigated area "		34,286
Unimproved area "		40,970
Average yield per acre (bushels)	wheat	28.2
" " " " "	corn	8.7
" " " " "	oats	31.1
" " " " "	barley	40.9
" " " " "	rye	11.8
" " " " "	potatoes	91.6
" " " " (tons)	lucerne	2.7
" " " " "	hay	1.3
Assessed valuation, 1900		$3,910,836

Sanpete is centrally located, being about 100 miles south of Salt Lake City. Its altitude is nearly 6,000 feet, and the climate is in every way delightful. Sanpete contests with Cache County for the title of the "Granary of Utah," and it certainly is one of the most fertile and productive areas in

the whole intermountain region. About five-sixths of the population are engaged in agricultural and grazing pursuits. Abundant water for irrigation purposes is obtained from the Sanpitch River, which traverses the valley.

Live-stock interests in this county are very important. Latest reliable reports fix the number of horses and mules at about 6,000, cattle at 12,000 and sheep at 250,000. The wool shipments from Manti annually reach about 3,000,000 pounds. Such fruit as apples, pears, plums, apricots, gooseberries, currants and strawberries grow to perfection. The streams which dash down from the Wasatch Mountains in the east of the valley not only supply the farms with irrigation water, but furnish power for about thirty mills in the cañons, and the pine forests of the Wasatch and Sanpitch mountains make lumber plenty and cheap. The beautiful oolite sandstone, of which the Manti Temple is built, is a cheap and popular structural material for the residents of the valley. Abundance of coal and firewood exists in many places and is exported to the neighboring valleys. Reservoir opportunities are to be found in many places. Among the mineral resources of the county fine prospects of silver and lead have been opened in the west mountains, while salt, gypsum, lime, ochre, asphaltum, fire-clay, brick-clay, alum, saltpeter and other minerals abount. The capital of Sanpete County is Manti, settled in 1849, situated at the foothills of the Wasatch Mountains, on the east side of the valley. Its population is 2,480, and it has fine schoolhouses and a number of good stores. The beautiful Manti Temple, a marvel of architectural grace, and dainty in color and design, and, indeed, one of the greatest of the Mormon temples, is here located on a point of a hill, seventy feet above the level of the town, and is a conspicuous feature of the landscape as seen from many miles to the north or south. Manti is proud of its fishponds and of its warm springs, its clear atmosphere and romantic scenery, and very justly claims to be a sanitarium. Ephraim is an important town in the county a few miles north of Manti, with a population of 2,086, and with nearly all of its homes built of solid stone. Spring City, a few miles north, has a population of 1,135. Mount Pleasant, with a population of 2,372, is the second city of the county in importance. It has a bank, good schools, hotels, a newspaper, well-built homes, flourishing farms and enterprising citizens. Fairview, Milburn, Chester, Wales, Freedom, Fountain Green, Sterling and Mayfield resemble each other in their principal attributes of thrift and that their inhabitants are happy and contented in the midst of plenty. No such thing as actual poverty is known throughout the county. The average wealth of the citizens may not be great in money, but they have all the means of sustaining a comfortable livelihood, and many of them are nabobs in a small way, and are surrounded by all the comforts of life and many of its luxuries. Their lives are passed in peace and quietude, in the midst of fertile fields, surrounded by magnificent mountains, in a healthful climate. They have good horses and vehicles, good roads, good barns and haystacks, orchards loaded with fruit, hives full of honey, cattle on a thousand hills, flocks and herds in the mountain vales, and if they are not happy the fault lies not in their temporal condition.

SEVIER COUNTY.

Population (census 1900)		8,451
Cultivated area (acres)		26,300
Irrigated area "		26,300
Unimproved area "		21,000
Average yield per acre (bushels)	wheat	28.2
" " " " "	corn	28.7
" " " " "	oats	28.6
" " " " "	barley	19.9
" " " " "	rye	13
" " " " "	potatoes	129.4
" " " " (tons)	lucerne	2.7
" " " " "	hay	1.2
Assessed valuation, 1900		$1,883,897

Sevier County adjoins Sanpete on the south. Its greatest agricultural areas are found in the Sevier Valley and its tributary and along Salina Creek. Along the course of the Sevier River are a number of towns of some importance, and between them is a great extent of arable and cultivated land, all of which is irrigated, there being 206 miles of irrigating canals within the county. The land is extremely fertile, the usual cereals and grasses yielding well. The yield of wheat and barley is unusually high. In the southeastern portion of the county the mountains are high, but among the peaks are frequent plateaus of great extent, whose summer range for cattle is not excelled by any in the State. The scenery among these mountain ranges is not so wild as it becomes farther south, and is relieved by the view of large stretches of timber and pasture land. Sevier County has been well developed, considering its remoteness. Building stone of excellent quality abounds in the foothills. Richfield is the county-seat, with 1,998 people. Like nearly all of the other towns in the county, it is surrounded by a rich agricultural area. Tradition has it that a prehistoric city whose people were attracted there by the nearby warm medicinal springs once occupied the site of Richfield. The town has two steam planing mills, a steam flouring mill and a grain elevator, besides other important buildings. Like all other Utah towns, the streets are lined with shade trees and streams of mountain water. Another principal town in the county is Monroe, population 1,057, with its nice residences belonging to wealthy cattle and sheep owners, and its industrial enterprises. Mexican onyx, alum, coal and gypsum abound in the mountains near by. A town in the southern part, Joseph, at the mouth of Clear Creek Cañon, where the soil is fertile, and in the neighborhood of undeveloped mines of gold, silver and copper, has a large flouring mill, a small brass foundry and a pork-packing establishment. Joseph has a population of 626, and is supplied with water-works. Glenwood, east of Richfield, population 549, has good water-power, two flouring mills and an ambition to possess other manufacturing concerns. Other smaller towns are Redmond, Aurora, Sigurd, Central, Annabella and Burrville.

PIUTE COUNTY.

Population (census 1900)			1,954
Number of farms			173
Cultivated area (acres)			2,226
Irrigated area "			6,796
Unimproved area "			12,223
Average yield per acre (bushels)		wheat	20.4
" " " " "		oats	26
" " " " "		potatoes	131.7
" " " " (tons)		lucerne	1.7
" " " " "		hay	1
Assessed valuation, 1900			$419,151

This is one of the small counties in the south central part of the State. It is almost wholly covered by high mountains, the Wasatch at this point reaching an altitude of nearly 12,000 feet. Gold, silver, lead and copper are the principal products of the surrounding mines, but more or less quicksilver has been and is being mined. From an agricultural point of view Piute County is not conspicuous, and yet several hundred people derive sustenance therefrom, the water being in abundance and the soil fruitful. Circle, with a population of 538, is the principal settlement, with Bullion and Koosharen close seconds.

MILLARD COUNTY.

Population (census 1900)		5,678
Number of farms		470
Cultivated area (acres)		16,036
Irrigated area "		16,389
Unimproved area "		42,750
Average yield per acre (bushels)	wheat	22.8
" " " " "	corn	17.7
" " " " "	oats	31.4
" " " " "	barley	29.7
" " " " "	rye	16.4
" " " " "	potatoes	144.7
" " " " (tons)	lucerne	2.8
" " " " "	hay	1.4
Assessed valuation, 1900		$1,939,701

This is a large county in the southwestern portion of the State. Its county seat, Fillmore, in the early history of Utah was the capital city of the Territory. There is much land subject to entry in this county which will ultimately become productive by the extension of the irrigation system.

General farming is carried on successfully, but mining and stock-raising are the principal occupations of the people.

The climate is temperate, and cattle and all kinds of grazing stock do well. It is a region to which hundreds of thousands of sheep are driven in the winter, a circumstance which contributes as much to the good fortune of sheep-raisers from other counties as to the well-being of the inhabitants of Millard County. In the spurs of the Wasatch Mountains and in some of the desert ranges a number of mines have been discovered, although but little worked. A beautiful black onyx found here is attracting attention among builders in Salt Lake and elsewhere. This is quite likely to become a rival for decoration purposes to the lighter-colored onyx found in other portions of Utah. Nothing to rival this beautiful stone has so far been discovered in America. Of the minerals lead, silver, gold and copper seem to predominate, and promise to make the mining interests of the county important in the future. Fillmore, Kanosh, Scipio, Deseret and other towns supply a thriving farming population. The Oregon Short Line passes through the county, affording means of transportation for its products and its requirements. Cattle and sheep constitute its principal exports. Filmore has a population of 1,037. Other smaller towns are Deseret, population 500; Hinkley, 591; Kanosh, 665; Holden, 472; Scipio, 578. At Leamington an attempt is to be made by Eastern capitalists to divert enough of the waters of the Sevier River to the high land to reclaim a large area, now desert and used only for grazing. Sulphur mining gives promise of becoming important when the development of the deposits is further advanced.

BEAVER COUNTY.

Population (census 1900)		3,613
Number of farms		373
Cultivated area (acres)		10,409
Irrigated area "		10,636
Unimproved area "		13,876
Average yield per acre (bushels)	wheat	20.7
" " " " "	corn	17.1
" " " " "	oats	26
" " " " "	barley	34.3
" " " " "	rye	4.8
" " " " "	potatoes	110.2
" " " " (tons)	lucerne	2.5
" " " " "	hay	1.7
Assessed valuation, 1900		$1,480,465

Beaver County is situated toward the southwest portion of the State, extending from the Beaver range of mountains to the Nevada line. The western portion lacks moisture, but the eastern half is well watered and most

fruitful. The Wasatch Mountains in this county are magnificent and lofty, supplying Beaver River with numerous tributaries and securing facilities for irrigation to a large farming population. The average altitude of the agricultural land is about 6,000 feet. Alfalfa and small grains are the principal crops, but in some localities there are a few orchards. About 2,000 acres are in wheat, the rest being in corn, barley, lucerne, hay, potatoes, etc. It has a great variety of mineral resources, and contains several mining districts. At Sulphurdale are located the largest sulphur works in the State, giving employment to many men and teams. Its capital, Beaver City, has a population of 1,701; is one of the principal cities of the South; other towns in the county are Greenville, Adamsville, Milford, Sulphurville and Minersville.

Beaver County has room for much farming population, and its mining industries, elsewhere discussed in this account, are sufficiently important to insure a market for a large amount of farming products.

IRON COUNTY.

Population (census 1900)		3,546
Number of farms		346
Cultivated area (acres)		6,610
Irrigated area "		6,143
Unimproved area "		9,157
Average yield per acre (bushels)	wheat	20.3
" " " " "	corn	12.5
" " " " "	oats	35.7
" " " " "	barley	42
" " " " "	potatoes	71
" " " " (tons)	lucerne	2.4
" " " " "	hay	1.2
Assessed valuation, 1900		$1,097,450

Iron County is situated in the southwestern part of Utah. Its area is about 3,400 square miles, a large portion of which is now being utilized for grazing purposes. The great Escalante Desert on the west affords winter quarters for thousands of cattle, horses and sheep, which return to the Wasatch Mountains on the east in the springtime, where they remain during the summer, subsisting upon the nutritious grass and sparkling waters of this beautiful range. The fine pasturage afforded by the native bunch-grass and other hardy varieties that cover the mountain slopes, and even the great desert, has made stock-raising a valuable industry in Iron County. Great numbers of horses and cattle are driven or shipped eastward from there each year, and with the thousands of pounds of wool exported annually furnish one of the most important sources of revenue to the county. The Wasatch Mountains, along the eastern border of the county, are densely covered with forests, and the lumber interests are important. Panguitch Lake is a splendid body of clear crystal water situated at the top of the range fifteen miles east of Parowan City. It is much resorted to by pleasure-seekers during the summer season. The settled portion of the county lies along the western base of the mountains, a distance of fifty miles. The principal settlements of Iron County are Parowan, population 1,034; Cedar City, 1,425, and other lesser towns. Parowan, the county seat, is situated in the central part of the county, near the base of the Wasatch Mountains. It is built on elevated land, making it an observatory to the great Parowan Valley. Cedar City is nineteen miles south of Parowan, in the Rush Lake Valley. It is one of the leading towns of Southern Utah, and may become the metropolis of that portion of the State. Its location is favorable in every respect, being on the line of one of the proposed roads to Southern California, adjacent to large deposits of coal and the most extensive iron fields in the world. It is midway between Denver, Colo., and Los Angeles, Cal., hence the right place for a large city. The entire people of the county are intelligent, generous and hospitable, and are in good financial condition. The people at large take a great

interest in the cause of education. Aside from the district school, the county has three church schools. The chief pursuits of the people are farming and stock-raising.

The land is very productive. All that is now under cultivation is well irrigated. Parowan Valley will, no doubt, become the agricultural stronghold of the county. It is comparatively level, sloping gradually from the Wasatch Mountains on the east to the hills on the west. At the base of these hills is found one of the curious features of Southern Utah—Little Salt Lake, five miles in length by three-fourths of a mile in width. Parowan Valley is twenty-five miles long by ten miles wide, extending northeast and southwest. Its soil is very fertile, producing wheat, oats, barley, potatoes, hay, fruit and vegetables. All the land in the valley can be utilized for agricultural purposes by means of reservoirs and artesian wells, the latter now being used very extensively. The estimated flow of water from the average well is fifteen gallons per minute at a depth of forty-five feet. Reservoir sites are numerous and extensive, and when developed will make it possible for the uplands at the foot of the mountains to be irrigated, in consequence of which the lowlands will be watered by sub-irrigation, making very profitable hay ground. Rush Lake Valley, forty-five miles long by ten wide, lies immediately south and west of Parowan Valley. In this valley are found the thriving towns of Kanarra, Enoch, Hamilton Fort and Cedar City. The land is well watered and exceedingly productive. The Northeast Canal & Reservoir Company are taking out a canal from Coal Creek, near Cedar City, which will carry sufficient water to irrigate 2,400 acres of upland and 1,000 acres of hay land.

The average price of cultivated land throughout the county is $25 per acre. The chief products are alfalfa, wheat, oats, barley, potatoes and apples. Alfalfa predominates.

Owing to the elevation of Iron County, its situation between the lofty rain barriers of the Sierra Nevada on the west and the Wasatch Range on the east, and its generally mountainous character, its atmosphere is light, dry, clear and invigorating. Notwithstanding there is a great variation in temperature, the climate in all parts is very salubrious. In summer it is agreeably cool and refreshing in the upper valleys, mild in the lower, and decidedly warm near the desert tracts. The fall of snow in winter is light in the lower valleys, but deep in the mountain cañons and upper valleys, furnishing a large supply of water for irrigating.

This county will grow yearly in agricultural importance. Its wonderful mines of gold and iron, elsewhere discussed, must soon be extensively developed, and then will follow the establishment of manufacturing industries, employing a large number of operatives. Local demand under these conditions will compel the reclamation and utilization of the vast quantities of tillable but now unproductive lands.

KANE COUNTY.

Population (census 1900)		1,811
Number of farms		238
Cultivated area (acres)		2,235
Irrigated area "		1,539
Unimproved area "		2,757
Average yield per acre (bushels)	wheat	18.6
" " " " "	corn	17
" " " " "	oats	24.4
" " " " "	barley	24.7
" " " " "	rye	22.5
" " " " "	potatoes	108.1
" " " " (tons)	lucerne	5.3
" " " " "	hay	2.1
Assessed valuation, 1900		$424,973

This county adjoins Arizona in the central-southern portion of the State, but is remote from travel. A few towns—Kanab, population 710, Glendale,

Mount Carmel and one or two others—exist on the headwaters of the Rio Virgin and other streams which flow into the Colorado River. The greater part of the county consists of plateaus, suitable for sheep ranges, but the streams flow through deep gorges cut through the alluvial soil at such depths that the water cannot be diverted to the land. The scenery of this region is wild and romantic, and full of interest to the explorer, yet this feature does not contribute to its prosperity. The valleys to which water can be brought are narrow, limiting the arable land, but in such places farms are very fruitful, and the yield is correspondingly high.

GARFIELD COUNTY.

Population (census 1900)		3,400
Number of farms		512
Cultivated area (acres)		6,565
Irrigated area "		6,832
Unimproved area "		10,727
Average yield per acre (bushels)	wheat	17.5
" " " " "	corn	10
" " " " "	oats	20.6
" " " " "	potatoes	107.2
" " " " (tons)	lucerne	1.8
" " " " "	hay	1.1
Assessed valuation, 1900		$677,809

This is the southeastern county, situated in the midst of the wild, weird mountains and plateaus that drain into the Colorado. It is but sparsely settled, is remote from travel, and is comparatively undeveloped, but a few thousand acres being under cultivation. However, these yield high average crops.

The county is composed for the most part of high plateaus and mountain ranges, deeply-cut cañons, which rarely open to a sufficient width for agricultural operations; but the county is well adapted for sheep and cattle-raising, the chief industry. In the western portion of the county, however, along the east and west forks of the Sevier, there are several thriving farming towns, among them Panguitch, population 833, and Orton, and the country there is more open and suitable for cultivation.

GRAND COUNTY.

Population (census 1900)		1,149
Number of farms		112
Cultivated area (acres)		2,842
Irrigated area "		3,142
Unimproved area "		6,839
Average yield per acre (bushels)	wheat	17.3
" " " " "	corn	18.2
" " " " "	oats	20.3
" " " " "	barley	20.4
" " " " "	rye	9.2
" " " " "	potatoes	126.6
" " " " (tons)	lucerne	3
" " " " "	hay	1.2
Assessed valuation, 1900		$1,017,224

Grand County adjoins Colorado in the middle-eastern part of the State. Its resources are but little developed. A limited area is cultivated along the Grand River, but the principal portion of the county is used for range purposes. Several small settlements, such as Moab and Richardson, on the Grand River, have proven the fruitfulness of the county. At Moab Mr. A. J. Warner has a magnificent fruit farm, upon which he has demonstrated his ability to produce the finest fruits in the State. All climatic conditions are favorable in this county for fruit culture. A large area is open for reclamation, and a great agricultural future is no doubt in store for Grand. Two

hundred and forty-five acres are in orchards, and a shipping business of no mean proportions has already begun from Thompson Station of peaches, apricots, plums, pears and honey. These go in boxes to the mining districts of Colorado and to Salt Lake City. Grand County probably offers as good inducements to settlement as any other county in the State.

TOOELE COUNTY.

Population (census 1900)			7,361
Number of farms			517
Cultivated area (acres)			11,243
Irrigated area "			7,118
Unimproved area "			40,129
Average yield per acre (bushels)	wheat		20.7
" " " " "	corn		16.6
" " " " "	oats		34.4
" " " " "	barley		15.9
" " " " "	rye		10
" " " " "	potatoes		113.9
" " " " (tons)	lucerne		2.7
" " " " "	hay		2.2
Assessed valuation, 1900			$2,670,186

This county, lying west of Salt Lake County, was among the first to be settled in the State. It is large in area, but a great portion is absolutely desert and may never be of any value whatever. Strange to say, however, the desert lands are all set aside by themselves in the western part of the county, while the eastern half is as beautiful and fertile as any land the sun shines upon. In the lovely Tooele Valley, lying between the Oquirrh and Stansbury mountains, are some 20,000 acres of tillable land, about half of which is cultivated and well watered, partly from mountain streams and partly from drive artesian wells, which yield abundantly in most parts of the valley. Cultivated land in this valley is worth as high as $75 per acre, but there are many tillable acres that have not been taken up. Among the chief farming products are wheat, of which there is always a high yield per acre; potatoes, running up to 400 bushels; lucerne, fruit, etc. A considerable revenue is derived from the stock interests, wool, hides, beef and mutton being shipped in large quantities. Fruit is exceptionally fine in flavor, and the crops are large. Peaches yield as much as 300 bushels to the acre. A fruit canning and evaporating concern could do well in Tooele City, and it has been suggested that a fruit distillery would pay, owing to the cheapness of the fruit and the large quantities that go to waste every season for want of a market. The region is extremely healthful and conducive to long life, and the beautiful scenery, with mountain, lake and islands in full view, makes the eastern part of the county a very pleasant place to live in.

The county is reached by the Oregon Short Line. Tooele City, population 1,200, is the county seat. The largest town is the mining town of Mercur, population 2,351, and Grantsville follows next with 1,058.

JUAB COUNTY.

Population (census 1900)			10,082
Number of farms			320
Cultivated area (acres)			10,933
Irrigated area "			7,383
Unimproved area "			15,852
Average yield per acre (bushels)	wheat		27.8
" " " " "	corn		22
" " " " "	oats		35.8
" " " " "	barley		43.8
" " " " "	rye		9.1
" " " " "	potatoes		133.5
" " " " (tons)	lucerne		2.6
" " " " "	hay		1.3
Assessed valuation, 1900			$3,998,743

The county is situated in the center of the western side of the State, and consists of a long, narrow strip, extending westward from the Wasatch Mountains across the desert to the Nevada line. The greater portion of its population is engaged in mining in and about the Tintic Mining District, the mines of which have been discussed in this account under the head of "The Mining Counties." The greater part of the western portion is almost entirely without water, and some of it is covered with the Great Salt Lake Desert. Nevertheless, it offers winter range for innumerable sheep, which are able to find moisture sufficient for their needs among the gorges of the desert ranges which break across the plains in lines from north to south at intervals a few miles apart. The eastern part is well watered by numerous streams, and a great part of its area has been under cultivation for many years. The county seat is Nephi, population 2,208, designated by its enterprising inhabitants as the "Little Chicago." It is one of the most important towns south of Salt Lake City, and has extensive manufacturing interests. In this county is located the extensive irrigation enterprise of the Mount Nebo Irrigation Company. A geat reservoir near the foot of Mount Nebo furnishes water for the redemption of thousands of acres of land in Goshen Valley. This company has in contemplation the building of a beet-sugar factory equal in capacity to the one at Lehi.

WASHINGTON COUNTY.

Population (census 1900)		4,602
Number of farms		482
Cultivated area (acres)		5,642
Irrigated area "		5,555
Unimproved area "		2,327
Average yield per acre (bushels)	wheat	23.8
" " " " "	corn	18.5
" " " " "	oats	27.3
" " " " "	barley	28.7
" " " " "	potatoes	122.2
" " " " (tons)	lucerne	3.4
" " " " "	hay	1.8
Assessed valuation, 1900		$793,378

Washington is the most southern county. It is a semi-tropical region, and cotton is grown there—enough to supply a local mill of considerable capacity. It has long been known as "The Dixie of Utah," and the wines made there and the almonds, nectarines, grapes, figs, pomegranates and other unusual fruit and nuts grown there have given the county a character unlike that of any other Utah county.

Several years ago, in response to an application from the Salt Lake Chamber of Commerce, a committee of citizens appointed for that purpose by a public meeting held in St. George, the county seat, furnished the following statement in reference to the county:

The climate and soil south of the "rim of the basin" is admirably adapted to the production of all kinds of peaches, nectarines, almonds, plums, apples, pears, grapes, figs, pomegranates and other fruits. A large per cent. of what is now produced, however, goes to waste for lack of transportation facilities. The county is also well adapted to the growth of all kinds of early garden stuff, such as radishes, lettuce, asparagus, celery, tomatoes, beans, cucumbers, melons, onions and Irish and sweet potatoes; also flowers of the choicest varieties, many of which bloom in December. In the settlements along the Rio Virgin and lower Santa Clara rivers the season for out-door gardening begins in the latter part of January or the beginning of February. The climate of St. George and vicinity, with its delightful winters, often without a flake of snow, except what can be seen on the distant mountains, is unexceptionally healthful. St. George enjoys an ideal climate, and is destined to be the winter resort of the inter-mountain region. One of the four great

temples of the Mormon Church is here. It is a structure of beautiful design, and is one of the notable buildings of Utah.

Washington County is an interesting and productive portion of the State, and will in time furnish the means for many thousand people to cultivate the rare products for the growth of which its soil and climate are so admirably adapted.

WAYNE COUNTY.

Population (census 1900)		1,907
Number of farms		235
Cultivated area (acres)		5,732
Irrigated area "		6,116
Unimproved area "		9,679
Average yield per acre (bushels)	wheat	18.6
" " " " "	corn	23.5
" " " " "	oats	24.6
" " " " "	barley	14
" " " " "	potatoes	114.6
" " " " (tons)	lucerne	2.2
" " " " "	hay	1.3
Assessed valuation, 1900		$425,056

Wayne is a central-southern county, and is watered by the Fremont River. Much tillable land is open to setlement, and cultivated farms with water right and good title vary in price from $20 to $80 per acre. A great variety of products are raised. Sheep, wool, lumber and orchard fruits bring the farmer much annual revenue. The cimate is delightful, the winters mild and the summers cool. It is an ideal fruit county, and its agricultural possibilities are very great.

WASATCH COUNTY.

Population (census 1900)		4,736
Number of farms		515
Cultivated area (acres)		12,995
Irrigated area "		12,443
Unimproved area "		16,360
Average yield per acre (bushels)	wheat	19.2
" " " " "	oats	30
" " " " "	barley	41.3
" " " " "	potatoes	151.4
" " " " (tons)	lucerne	3.2
" " " " "	hay	1.7
Assessed valuation, 1900		$1,200,174

The greater portion of Wasatch County is occupied by the Uintah Reservation, which at present excludes from settlement from occupation one of the best watered and most fertile regions of the State. When the reservation is opened for settlement, as it will be when effect is given to an Act of Congress already passed, the agricultural development of the county will be speedy. Heber is the county seat, and the county is best reached by way of the Union Pacific from Park City. The reservation mentioned is known to contain many fertile valleys wherein successful agriculture will in time be extensively carried on.

EMERY COUNTY.

Population (census 1900)		4,657
Number of farms		552
Cultivated area (acres)		12,964
Irrigated area "		15,622
Unimproved area "		28,574
Average yield per acre (bushels)	wheat	19.3
" " " " "	corn	12.4
" " " " "	oats	25.5
" " " " "	barley	34.4
" " " " "	potatoes	64.9
" " " " (tons)	lucerne	2.1
" " " " "	hay	1.5
Assessed valuation, 1900		$1,292,399

The county lies in the middle-eastern part of the State. It is drained by Green River, from which it obtains its irrigation waters. In time its large unimproved area will be made available by water obtained from storage reservoirs in the mountains to the westward. This will, however, involve considerable outlay, but the outlay will yield ample returns to the investor. Castledale, population 718, is the county seat, which is surrounded by a large farming settlement. This county is destined to be developed into a productive agricultural region, and will in time have a mining output, especially of anthracite coal and copper.

CARBON COUNTY.

Population (census 1900)		5,004
Number of farms		108
Cultivated area (acres)		7,679
Irrigated area "		7,679
Unimproved area "		10,301
Average yield per acre (bushels)	wheat	21.3
" " " " "	corn	22.3
" " " " "	oats	28.3
" " " " "	barley	16.2
" " " " "	potatoes	68.5
" " " " (tons)	lucerne	3
Assessed valuation, 1900		$2,012,764

This county was taken from Emery by the last Territorial Legislature of Utah. Thirty or more irrigation streams, owned exclusively by farmers, are in operation, and water is ample for all purposes. Its agricultural characteristics are much the same as Emery County, and the large amount of unimproved land offers opportunity for a considerable increase in population. Within it are the coal-mining towns of Castlegate, population 1,109; Clear Creek, Scofield, Winter Quarters, the commercial town of Price and the railroad town of Helper.

RICH COUNTY.

Population (census 1900)		1,946
Number of farms		269
Cultivated area (acres)		19,776
Irrigated area "		20,460
Unimproved area "		57,793
Average yield per acre (bushels)	wheat	30
" " " " "	oats	41.1
" " " " "	barley	41.5
" " " " "	rye	20
" " " " "	potatoes	194.4
" " " " (tons)	lucerne	3.3
" " " " "	hay	1.1
Assessed valuation, 1900		$752,960

Randolph is the county seat, having a population of about 821.

This county lies in the northeast corner of Utah. It is not very large, but it is nearly all agricultural land. Thirty thousand acres are cultivated and in pasture, the tributaries of Bear River furnishing an abundance of water. The elevation of Bear Valley is about 7,000 feet, rendering the climate somewhat cold, but the hardier crops flourish. A beautiful feature of the northern part of this county is Bear Lake, a magnificent sheet of water about fifteen miles in width by thirty or forty in length. This is one of the largest bodies of fresh water that exist at such elevation in the mountain regions, and is the natural reservoir upon which the great Bear River Canal depends for its permanent summer supply. The population of the county is not great, but the people are generally well-to-do, owing to the success which usually attends their stock-raising enterprises.

The following counties, not classified as "Agricultural Counties," have the following assessed valuation for 1900:

San Juan	$262,750
Uintah	1,057,273
Summit	4,292,250
The total assessed valuation of the State for 1900 was	105,629,041

NOTE.—The figures given in the foregoing review of agricultural counties, with the exception of the figures referring to the present population, and the assessed valuation for 1900, were made by Joseph P. Bache, Territorial Statistician, and include the year 1894. They are taken from the official territorial publication, are the latest obtainable, and are believed to be the best estimates so far made. It is hoped the statistics as to the average yield per acre of the different crops reported will be of value to the reader in showing the effect of altitude in different localities upon the production of these crops. The statistics as to the number of farms, cultivated, irrigated and unimproved area, will no doubt assist the homeseeker in determining which counties offer the greatest opportunities for settlement.

THE SUGAR BEET.—The growing of the sugar beet is becoming one of the leading occupations of the Utah farmer. Especially is this true in Utah and Weber counties, where are located great sugar works. These two plants turned out in 1900, according to figures given in the Salt Lake Tribune, 17,200,000 pounds of sugar and sticed 18,000 tons of beets. The farmer received from $4.25 to $4.50 per ton for the beets, from which it will be seen a large sum of money annually goes to the beet-raisers of Utah. A mill is to be built in Logan during 1901, and several others are in contemplation elsewhere in the State.

LIVE-STOCK.

Mr. H. L. A. Culmer, in his "Resources and Attractions of Utah," thus discusses the advantages enjoyed by the stock-grower in Utah:

"If our climate is too dry for the luxuriant growth of grasses in the valleys throughout the summer, the conformation of our Territory (State) is such that it fully offsets to the stock-raiser whatever drawbacks may be laid to the want of summer rains. As the feed begins to give out on the lower benches in the spring, the snow-line is receding on the foothills, and stock is pastured at higher altitudes as the season advances, until, in the midsummer, they graze among the grassy valleys of the mountains and on the cool, high plateaus. When winter approaches they gradually retire again, and by the time of general snowfall are roaming over low, wide ranges, where they cannot exist in summer for heat and want of water. This changing life brings them health and hardihood. They have a 'summer out' every year, and are thus developed into the sturdiest races of America. The ranges of one season are held in reserve at another. During the summer, on the millions of acres of the interior basins, too dry for summer ranges, the native bunch-grass is maturing and cures, standing, ready for the immense flocks and herds which will winter there. In these regions the snowfall is light—enough to furnish water for the stock, but not to bury the dry, fattening bunch-grass, famous for its nutritive qualities."

CATTLE.—The cattle interests are receiving much attention, and marked improvement in the breeds has been noticed during the past few years. The tendency is to handle few cattle but better ones. Those engaged in the business seem to be convinced that there is more money in keeping up the breeds and keeping the number down to a hay cutting and feeding proportion. Much beef is consumed in the State, but the shipping business is growing rapidly, and great numbers are sent to the markets of the East and surrounding States. The holding of the convention of the National Live Stock Association at Salt Lake in January, 1901, brought about 5,000 stockmen to Utah, and evidence the State's growing importance in the stock industry. The dairy interests are by no means unimportant, it being estimated that they return from $800,000 to $1,000,000 annually.

HORSES AND MULES.—Of these useful animals the State has from 80,000 to 100,000 head. They are better animals for their weight and size than

any others in America, and have been graded up until they boast the blood of the leading breeds of America. They are said to excel in wind, endurance and fleetness, and for several years past work and farm horses, fancy roadsters, fine carriage and heavy freight horses have been extensively raised. The qualities of strong feet and lungs remain with the horse after he has been exported, and for this reason Utah horses are in steady demand.

SHEEP.—Exact figures are not obtainable, but the number of sheep in Utah is placed at 2,500,000. The sheep shipments for 1900 were about 400,000, which, according to an estimate of Mr. Clinton, an authority, sold for an average price of $3.25 per head. The wool crop for 1900 was 14,000,000 pounds. The original Mexican stock has given place to fine breeds, such as the Cotswold, Spanish and French Merinos, and now wool of a superior quality is produced. The receipts of the Union Stock Yards, Salt Lake City, for 1900 were as follows:

Sheep	165,492
Cattle	36,816
Hogs	221
Horses and Mules	12,625

TWO INDIAN RESERVATIONS,

The Uncompahgre and Uintah, are located in the northeast portion of Utah, and comprise most of the counties of Wasatch and Uintah. An Act of Congress was passed in 1894 providing for the opening of these reservations to settlement. The announcement in the press dispatches of the enactment of this law produced numerous inquiries from different portions of the United States, and the following information about the region is given: The two reservations contain an area of 6,207 square miles, or 3,972,480 acres—the Uintah 3,186 square miles, or 2,039,040 acres, and the Uncompahgre 3,021 square miles, or 1,933,440 acres. There are now 2,000 Indians on the reservations, and the head of each Uncompahgre family will receive 320 acres, and the other members of the family 160 acres each—counting five Indians to the family. The Uintahs will probably receive the same. It is estimated that 384,000 will be needed to supply the Indian demand, and that 3,598,480 acres will remain for white settlers. Probably 50 per cent. of this land is suitable for agricultural or stock-raising purposes, the other 50 per cent. being mountainous, and believed to be rich in a diversity of valuable minerals. The great asphaltum fields of Utah and the larger deposits of ozocerite, gilsonite and elaterite are located within these reservations. No title to any of the lands in either reservation can be secured until the Act goes into complete effect, which will be when the allotment of lands to the Indians, now going on under the direction of a special United States commission, is complete. The country is well watered, the climate is delightful, and when the lands become available these reservations will materially add to the wealth and production of the State. Persons contemplating settlement in this portion of Utah are advised not to come until assurances from Washington are received that all legal objections to the entry of the whites upon the reservations are removed. It is probable that the asphaltum deposits will not be subject to entry under the mining laws—these deposits, it appears, are to be held by the Government pending legislation for their sale at special prices.

MANUFACTORIES AND INDUSTRIES.

Mr. Culmer, in discussing this important branch of the business of the State, says, among other things, in "The Resources and Attractions of Utah:"

"The subject of home industries has commanded the attention of the people of Utah from the time of its first settlement. Isolated as it was in the

beginning, necessity compelled the production of many articles which other communities import, and drove the people into finding means to manufacture them. It was thus revealed that from the many resources that lie about us a large proportion of the materials used at home could be made here, and in early times the self-supplying faculty of the residents was developed under great difficulties, and they learned to do many things in a primitive way that have since been refined upon and expanded, until the quality and quantity of the goods manufactured are by no means insignificant. 'Home manufacture' has been so long and so steadily a familiar watchword with the people of Utah that there are not many communities in the West that have attempted such various lines of industry. Not all of these have succeeded, yet we will bear comparison with many older States. There is a genuine determination among the people of Utah to establish and sustain the manufacturing interests of the State. We accuse ourselves and each other of a lack of interest in these matters, but this only shows that we are alive to the necessity. The volume of manufactured material produced is a proof of our sincerity in this direction. The leaders of the people in early times told them that they had all the material necessary to make them one of the most prosperous and independent peoples on earth if they would only make use of the material that nature had placed at their disposal. Repeated efforts under adverse circumstances gave the start to a manufacturing community, and as early as 1850 the industrial products of Utah amounted to $291,220. In 1860 this amount had increased to $900,153. Ten years later, according to the census returns, it was $2,343,019, and in 1890 the returns showed that there were 310 enterprises of this character in operation, turning out a product valued at $5,836,003. The capital invested was $4,405,881. The plants cost $3,215,511, and they used that year raw material worth $2,137,291. Three thousand two hundred and seventy-four hands were employed, and the wages paid were $1,597,177. We have good reason to believe these figures to be understatements, even for 1890, but, were the data of today obtainable, a considerable increase would now be shown; but these dry figures must impress every thoughtful reader that the people of Utah engage heartily in the development of their industrial possibilities, and by this means maintain their prosperity and contribute to the well-being of the population."

The Territorial statistician, on the 1st of January, 1895, makes the following figures. These are the latest obtainable from official sources:

Number of enterprises, 1,880; annual product turned out, $6,678,118; capital invested, $5,476,246; cost of plants, $5,986,215; raw material anually used, $2,640.038; number of hands employed, 5,054; wages paid, $2,027,118.

Thus will be seen how rapidly increased in importance the manufacturing interests of Utah during the first five years of the last decade. It is regretted that manufacturing statistics of Utah for the census year of 1900 have not at this writing been announced by the Government. Of manufactures there is almost an infinite variety. One great stimulus to these industries has been the continued encouragement of the Deseret Agricultural and Manufacturing Society of Utah, which for many years has exhibited to the people, at its annual fairs at Salt Lake City, the products of the different manufacturing institutions.

In the limits of this book it will be impossible to enumerate all of the institutions now doing a thriving business. The writer will content himself with the mention of the larger manufactures and industrial mills.

Woolen Mills.—Woolen mills are in operation in Salt Lake, Utah, Beaver and Washington counties. The most important of these is the Provo Woolen Mills, having an annual output valued at $250,000, employing 175 hands, and consuming yearly 700,000 pounds of Utah wool, for which during 1900 the mill paid an average price of sixteen cents per pound. This mill was erected in 1872, and is the largest woolen factory west of the Missouri River. It has survived all panics, is free from mortgage, has paid dividends

regularly, and enjoys the distinction of being the first woolen mill erected west of Chicago. Its power is derived from steam and from a canal, developing at the mills 150 horse-power. Eighty-five per cent. of the product of 1900 was delivered to Eastern markets. The mill is to be greatly increased in capacity during 1901. Near Springville, in Utah County, is located a woolen mill of about one-eighth the capacity of the Provo Mills, in the operation of which results equal to those of the Provo Mills are obtained. The cloth manufactured in these mills finds ready sale in Colorado, California and the States of the inter-mountain region. Everywhere it is sold it compares favorably with the product of the finest mills of the East. The Deseret Woolen Mills in Salt Lake, which manufactures woolens, dress goods, flannels, yarns and fine grades of white blankets, is another extensive establishment. It employs sixty operatives, and consumes 200,000 pounds of Utah wool annually. In connection with this mill a large knitting factory is operated. There are smaller but not less complete mills than the Provo at Beaver, St. George, Ogden, Brigham City and Hiram, Cache County. Their product is chiefly consumed in the neighborhood of their location.

Sugar Works.—The Lehi Sugar Mill, in Utah County, now ten years in operation, is one of the largest manufacturing institutions in the State. The factory produced in 1900 11,400,000 pounds of refined sugar. This resulted from the cutting of 50,400 tons of beets, for which the factory paid $4.50 per ton, 6,000 acres being necessary to the growth of beets for the supply of this mill. Two hundred and twenty-six thousand eight hundred dollars went into the pockets of the beet-raisers during 1900, and 250 employes were on the payroll. Ten per cent. annual dividends have been paid for several years, and the capacity of the plant is now 1,200 tons per day. The product for 1900 at $5.50 per hundred will amount to $575,500, all of which goes into Utah pockets.

During 1900 operations were active in the new sugar factory at Ogden. This factory has a capacity of 350 tons of beets per day, and the output for 1900 was 5,800,000 pounds. Here are employed 214 men. The selling value of the 1900 product was approximately $300,000. The entire demand of Utah for sugar is 18,000,000 pounds, 16,200,000 pounds of which were supplied in 1900 by Utah mills. Next year every pound used in the State will be made at home. Other plants at Gunnison and Logan are in contemplation, and the time is probably not far distant when our neighboring States, north and east, may look to Utah for their sugar. An attempt was made by the sugar trust to kill the Lehi industry some years ago, but the Utah people were loyal to the home product, and the trust retired in disgust.

Soap Works are in operation in different portions of the State. There are three factories in Salt Lake and one in Ogden, and the output is almost equal to the demand of the State.

Boot and Shoe Manufactories.—Many hundred hands are employed in Utah in the shoe factories, which are located in Salt Lake, Ogden, Provo, Logan, Lehi, Spanish Fork and in many of the country towns. The largest concern is in Salt Lake City, conducted by Zion's Co-Operative Mercantile Institution. The concern employs about 200 hands, and turns out annually from $200,000 to $250,000 worth of manufactured material.

Clothing Manufactories.—There are several institutions in the State devoted to this industry, the output of the largest of which, that operated by the Z. C. M. I. in Salt Lake, is valued annually at $60,000.

Silk Manufacturing.—This is a growing industry in the State. The exhibits of Utah's silk at the World's Fair attracted widespread attention. The industry began in Utah in 1855, and in the past has been carried on mostly in the homes of the people. There are thousands of mulberry trees in the State. The climate is perfectly adaptable to the silkworms, which are free from the diseases so fatal to them in damp climes. The time is coming

when Utah's silks will be extensively manufactured. The Legislature of 1896 created a State Silk Commission, and offered a bounty of twenty-five cents per pound for cocoons produced in the State and fed entirely on mulberry leaves. The law is working well. The mulberry tree, of which there are thousands in the State, thrives in all parts of Utah.

Of flouring mills, oatmeal, cracked wheat and cracker establishments, there are several in the State. Breweries exist in many towns, three of the largest being situated in Salt Lake. One of these has a capacity of 20,000 barrels per annum, and bottles 600 dozen per day. Brickmaking and charcoal-burning industries exist in many places.

Portland cement is manufactured in Salt Lake City, one plant having made in 1900 60,000 barrels and added betterments to the value of $30,000. The product is all taken in the inter-mountain States.

Canneries.—Four large institutions, chiefly devoted to the putting up of tomatoes, consumed the product of 700 acres of tomatoes in 1900.

Among the other manufacturing establishments may be mentioned machine shops and foundries, saw-mills, lath and planing mills, stone quarries, lime-kilns, potteries, tanneries, factories for polishing gems, knitting factories and concerns which manufacture brooms, brushes, vehicles, ice, confectionery, mattresses, crackers, showcases, vinegar, plaster of paris, steam boilers, harness, paper boxes, rubber stamps, coffins, mosaic tiles, picture-frames, upholstery, chemicals, fur goods, gloves, picks, iron fencing, lead pipe, etc.

Notwithstanding the great variety of manufacturing concerns which have been mentioned, opportunities are open for still others to be inaugurated, which can undoubtedly be made to pay good returns on the cost of plants. Among them have been suggested cotton mills, a carpet factory, paper mills, to replace those recently burned in Salt Lake County, works for the manufacture of agricultural implements, white lead, gunpowder, whiting, iron pipe, sewer pipe, window glass and bottles, soda-ash, putty, starch, candles, paints, etc.

Crude materials exist on every side in abundance. Labor is plentiful and willing, and industrial developments in Utah promise in the near future to be of great magnitude.

Coal has heretofore been an essential to the production of power in the State, but its use is being rapidly lessened by the employment of electricity. The waters of several mountain torrents have been harnessed and utilized for the production of electricty for power purposes.

Electrical Power Plants.—The Pioneer Electric Power Plant at Ogden ranks among the great electrical enterprises of the country. It was completed in 1897 at a cost of $1,500,000, and the electrical force generated aggregates 10,000 horse-power. The water is carried along the side of the mountain for a distance of seven miles in a steel and wooden pipe seventy-two inches in diameter to the entrance of Ogden Cañon, where it is used to furnish motive-power for the generating machinery. On the flat at the base of the mountain an immense power-house has been built, where power is produced and sold at a cost enabling factories to run at a minimum cost. The bulk of this power is utilized in Ogden, but a portion of it is transmitted to various other cities for motor cars, street-lighting and other purposes. This plant, together with that of the Big Cottonwood Power Company in Cottonwood Cañon, near Salt Lake, and the Salt Lake and Ogden gas and electric plants at Ogden and Salt Lake, have been recently consolidated, and are now operated and owned by the Utah Light & Power Company, having headquarters at Salt Lake. This company's system is the largest for the distribution of light and power in Western America, having a total of 11,000 horse-power and 100 miles of high-tension transmission lines. Ogden is located in the midst of a region rich in agricultural and mineral resources, and is well supplied with railroad facilities, so this enterprise cannot fail of success.

After the water is utilized for the generation of electricty it will be conveyed to the valley and made to redeem thousands of acres of arid lands.

In Big Cottonwood Cañon, twelve miles from Salt Lake, another great enterprise for the generation of electrical energy is situated. This is one of the plants now owned by the Utah Light & Power Company. Nearly two years were consumed in the construction of this plant, a great dam was built and a long tunnel driven to bring the water to a connection with the pipes leading to the generating mill below. The expenditure is estimated at $500,000. Current is conveyed over copper cables to Salt Lake, where it is employed for general house and street lighting purposes, for the running of electric railroads and for innumerable other uses requiring power. Another company, the Pioneer, of ample capital, has completed an equally large plant below the Big Cottonwood plant, using the same water now employed by the Big Cottonwood Company. The current of the Pioneer Company is conveyed to Salt Lake and is used for operating the Salt Lake City Railroad system and for other purposes. The aggregate of current produced by these three great plants is sufficient to enable Salt Lake to take on no end of new manufacturing enterprises, the raw material for which is found all around it in limitless quantities. The writer regards these power plants of the utmost importance to the future development of Salt Lake, which, by their aid, will become the manufacturing center of the inter-mountain country. These electrical companies propose to transmit power to Park City and other mining camps, where it will be utilized in operating pumps, mills, hoisting plants and for numerous other purposes.

The Telluride Power Transmission Company has a plant in Provo Cañon, from which power is transmitted to the mining camps of Mercur and Tintic, a distance in lines of 115 miles. When plans laid out for 1901 are completed the feat of transmitting electricity over a continuous line of aluminum wire 224 miles long will be accomplished by this company. This will be double the distance ever before attempted. Great expenditures are now being made to improve the plant and harness anew the waters of Provo River.

The Hercules Company, which in 1900 absorbed the Logan Light & Heating Company, is building a mammoth plant in Logan Cañon, and with the power of Logan River is developing a large amount of energy, which will be increased during 1901 many-fold. This company in consolidation with the Provo Company is the newest candidate for the patronage of the cities and towns between Provo and Logan and adjacent mining camps. The horsepower of these two plants will be equal to that of the Utah Light & Power Company.

Salt Lake City Water & Electrical Power Company.—This company has its power plant and installation in the Jordan narrows, nineteen miles south of Salt Lake City, close to the lines of the Rio Grande Western and the Oregon Short Line railways. Its water-power is derived from the waters of Utah Lake flowing through the Jordan River. The total amount of power available under a head of seventy-five feet at the company's powerhouse is estimated at from 6,000 to 7,000 horse-power. The company is capitalized at $1,000,000. The distance from the power station to Bingham is twelve miles and to Mercur eighteen miles, to both of which points power-transmission lines are now in operation.

It will thus be seen to what an advanced stage the development of electrical energy by water-power in Utah has progressed. Soon the use of coal for power-making will be obsolete, and every great mining camp and important city and town in the State will have ample power, cheaply delivered, for all purposes.

Irrigation Companies.—In the early portion of this work, under the head of "Irrigation," reference was briefly made to the fact that many large companies have undertaken the development of irrigation systems whereby vast areas of unproductive land will be redeemed and made available. These

companies construct reservoirs of immense area, and lead therefrom canals along levels sufficiently high to bring the lands sought to be redeemed under the influence of the water. They exchange a perpetual water right for each farm for a nominal sum per acre, and thereafter charge a small annual water rate per acre. The entire cost to the farmer is but little compared to the benefit received. The water is delivered to his farm without any expense to him other than that mentioned. These companies are responsible for a great part of the recent increase in the cultivated area of the State. They usually own or control large amounts of land, which they sell at reasonable prices and upon excellent terms. Those who are able to purchase lands will find it to their interest to investigate the advantages offered by these companies.

COMMERCE.

The trade and commerce of Utah is not limited by the boundaries of the State, but extends over the surrounding inter-mountain States. The following discussion of this subject in a book recently issued by the Salt Lake Chamber of Commerce is here inserted:

"In these matters, as in most others, while the proportion of our operations may not be so great as to excite wonder and admiration, it must be admitted that in point of variety no other State or Territory can view us with disdain. We have examined into the commercial activities of many States separately, and have been struck with the prevailing feature that each State, as a general proposition, maintains its activity in special lines, but in Utah this is not the case. The range of subjects which the man of trade in this State is called upon to consider is bewildering, and as varied as the numberless resources—mineral, agricultural and industrial—that are briefly referred to in these pages. If each of these interests can be developed, as we believe they will be, in proportion to their merits and the opportunities that exist in this State, the future of trade and commerce in the years to come will be exceedingly great. The demands of an active people, somewhat lavish in their requirements, endowed with energy, and learning to demand the luxuries as well as the necessaries of life, call for an increasing supply of the staples that engage the attention of commerce in every country. Not judging of trade by fluctuations in prosperity which affect every country, but marking the progress of commerce by years instead of by months, the trade of the whole State has increased steadily, until the volume of today bears an astonishing relation to that of a few years ago. This results principally from the fact that year in and year out, with as little oscillation as obtains in any other region, the State has enjoyed a continuous run of comparative prosperity for a great number of years. We do not wish to repeat our statements, but we cannot refrain from claiming that this is essentially due to the variety of means by which the well-being of the residents of Utah can be sustained.

"In the larger cities, such as Ogden, Provo, Logan and Salt Lake City, a genuine jobbing trade is supported. We have wholesale jobbing-houses, devoted exclusively to dry goods, or clothing, or groceries, hardware, fruits and produce, grain, boots and shoes, machinery and other single lines. Their trade is not confined to this State alone, but extends for hundreds of miles into other regions. In Salt Lake City the mercantile agencies, Dun's and Bradstreet's, have important offices. Reports are made daily to the trade, and hundreds of subscribers maintain this important feature of a commercial center. Not a few of the central cities of the State have traders and merchants engaged in gathering together the products of the State for export to remote distances. Grain, seeds, hides, wool, live-stock, tallow, furs, skins, eggs, butter, poultry, green fruits and vegetables, dried fruits, and such things, usually sent out in carload lots, return a considerable revenue to many

of the towns and cities adjacent to the railways. Besides this, those engaged in developing the mineral and other resources of the State ship a great many carloads of stone, marble, onyx, asphaltum, plaster of paris, fire-brick, etc., both east and west. The shipment of ores and bullion, gold, silver and copper, is confined principally to the work of the banks and smelters, and this, more than all else, brings the ready money into the avenues of trade and finance. Our imports are large—much too large when we consider the opportunities for manufacture that exist but are neglected in our midst—but it is not to be supposed that our net imports are measured by the railroad returns, because a large proportion of what we bring in is again sent out into the surrounding country by our jobbers. In a number of the larger cities some of the retail stores are as fine as any in the West."

The general credit of the merchants and traders of Utah is first class. Failures are comparatively few. The daily returns of the Salt Lake clearing-house furnish a fair means of measuring business. The clearances for 1900 were $120,676,183.18. By the Salt Lake Tribune, January 1, 1901, the deposits of thirteen Salt Lake banks are given as $16,747,874.96, an increase of $1,801,083.50 over 1899, and the loans and discounts of the same banks as $6,905,239.09, an increase of $1,498,633.04. To the conservative methods employed by the business men of Utah is due the resistance they offered to the direful effects of the panic of 1893. During this panic, when the banks of the nation were going to the wall and business institutions all over the land were crumbling into ruin, the banks and business houses of Utah, with one or two exceptions, were able to continue without interruption. In Salt Lake City not a single failure occurred among the banks, and on the dangerous days which succeeded the failure of the banks of Denver, Cheyenne and the cities of the Pacific Coast, not so much as the suggestion of a run was apparent in any banking-house in the city. About this time bonds of Salt Lake City, of the par value of $600,000, were sold in the markets of the East at a premium. But few foreclosures of mortgages occurred, and the writer is informed that, during the year which witnessed the greatest effects of the panic, some of the largest loan and trust companies doing business in Utah reported not a single default of either principal or interest by their debtors. These striking illustrations of business stability and credit result from the methods which prevail among Utah's business men. They are and always have been inherently opposed to doing business on credit or indulging in speculation. Conservative and careful, they never permit themselves to inaugurate booms or utilize their credit beyond the certain point of their ability to make their payments.

Nearly every year shows some increase in the railway mileage of the State. Salt Lake City and Ogden, both wholesale centers, send their goods throughout Southern and Eastern Utah, and have been brought into auspicious trade relations with the Northern and Northwestern inter-mountain States and the Puget Sound country by one of the component parts of that great Union Pacific system, the Oregon Short Line.

CLIMATE.

The climate of Utah belongs in the list of its resources and attractions, and has received the attention of some of the best writers on the subject in America, many of whom admit that it approaches very near to the ideal climate for which mankind is constantly in search. Father Silvestre Velez de Escalante, who reached Utah Lake on the 23d day of September, 1776, and who was the first white man to set foot on Utah soil, wrote in the diary of his journey: "Here the climate is so delicious, the air so balmy, that it is a pleasure to breathe by day and by night."

The most fastidious taste for climate can be satisfied in Utah, for the State has as many different climates as it has different altitudes. In some

localities springtime will be found in winter's season, in other the seasons are distinctly marked, and there are localities where the climate is fully described by the expression "winter and late fall."

But on the shores of the Great Salt Lake, and for fifty or more miles therefrom in every direction, is the climate of climates found. Within that region altitude is present and the air of the ocean belongs to the fortunate dweller, for the breezes born in the pure atmosphere of the encircling peaks are salted by the sea as they are wafted across the 2,500 square miles of its surface.

If the climate-hunter expects to find in Utah the equability of temperature such as the resident of Southern California pretends to enjoy, he will be disappointed. The climate is characterized by extremes of temperature in summer and winter. But these extremes are, happily, no greater than are necessary to good health. In climates where the average of temperature is about the same throughout all seasons of the year the people are said to soon become weary of the monotony, and to long for the genial warmth of a summer day and the invigorating air which comes with the snows of winter. If we are to take the judgment of men who have made different climates and their effect upon the human family a distinct study, we must conclude that climates which maintain an average temperature throughout the year are not conducive to the well-being of humanity. Such climates are said to promote lassitude and indolence, and under their influence the human mind, it is claimed, does not develop as fully as it does where extremes of temperature are recorded. These writers contend that the majority of the great men of the United States were born and reared in portions of the country where extremes of temperature occur.

MEAN TEMPERATURE.

The following table compiled by Prof. James Dryden, of the State Agricultural College, Logan, from scattered monthly weather reports of the United States Weather Bureau, shows the average mean temperature for each month of the year and the average for the year for twelve different sections of Utah. This fairly represents the different portions of the State:

AVERAGE TEMPERATURE AND NUMBER OF YEARS RECORDED.

	Altitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mean.	Average number of years record.
Corinne	4232	24.9	29.6	40.2	51.0	61.7	72.0	80.6	77.8	66.2	51.6	36.3	29.1	51.8	26
Fillmore	5100	27.0	27.7	39.4	48.6	57.7	65.9	73.7	74.4	65.2	52.8	41.1	29.1	50.2	4
Fort Duchesne	4941	9.8	18.9	36.6	49.2	57.3	65.6	71.1	69.8	62.6	47.8	33.8	20.5	45.3	7
Heber	5440	18.4	16.5	31.5	43.5	53.2	59.1	66.6	65.4	55.3	45.4	35.7	20.8	42.6	3
Levan	5010	20.5	22.6	35.1	45.8	56.1	64.1	72.4	71.2	62.2	47.5	35.2	24.5	46.3	5
Loa	....	23.2	24.5	33.1	41.2	51.4	59.3	66.4	64.4	54.7	42.9	32.4	32.7	43.8	4
Logan	4775	22.7	20.8	34.7	46.9	55.6	61.5	70.3	70.0	61.3	51.0	37.6	25.4	46.5	5
Moab	4000	28.3	35.5	45.6	55.1	65.6	72.0	78.7	74.4	64.6	52.4	38.8	32.9	53.7	6
Ogden	4307	28.0	32.5	41.3	52.8	62.3	71.4	79.9	77.4	66.2	52.4	38.8	31.6	52.9	25
Parowan	5970	27.6	29.0	38.6	46.9	56.2	63.5	71.0	70.9	59.9	49.2	39.5	27.8	48.3	5
St. George	2880	36.0	40.2	49.5	56.8	64.4	72.9	79.3	79.0	67.9	56.3	45.7	34.2	56.9	8
Salt Lake City	4354	27.8	32.8	41.6	49.2	58.5	67.8	75.8	74.8	64.3	53.3	40.1	32.2	51.5	31
State	....	24.5	27.5	38.9	49.0	58.3	66.2	73.8	72.5	62.5	50.2	38.8	28.4	49.1	.....

EXTREMES OF TEMPERATURE.

The mean temperature, however, gives at very best a very imperfect view of the temperature conditions of a locality. The extremes must be studied if we wish a full knowledge of the subject. The following table gives the highest and lowest—maximum and minimum—temperatures at Salt Lake City for each month of a period of five years (1891 to 1896), and may be taken as indicative of the extremes to be expected from year to year:

	1891.	1892.	1893.	1894.	1895.	Average.
January—						
Maximum	46	45	48	50	52	48.2
Minimum	12	2	4	*1	0	3.4
February—						
Maximum	55	60	49	43	54	52.2
Minimum	3	12	5	6	3	5.8
March—						
Maximum	64	68	73	67	76	69.6
Minimum	12	26	23	20	16	19.4
April—						
Maximum	79	73	72	77	79	76.0
Minimum	24	26	26	30	23	25.8
May—						
Maximum	86	85	86	85	83	85.0
Minimum	33	36	34	33	33	34.8
June—						
Maximum	84	98	92	89	90	90.6
Minimum	41	38	42	49	38	39.8
July—						
Maximum	98	96	99	96	95	96.8
Minimum	45	55	52	53	52	51.4
August—						
Maximum	95	100	96	95	97	96.6
Minimum	50	45	52	56	52	51.0
September—						
Maximum	89	90	86	85	90	88.0
Minimum	38	48	33	37	29	37.0
October—						
Maximum	77	80	77	77	81	78.4
Minimum	30	30	30	28	32	30.0
November—						
Maximum	72	66	64	64	66	66.4
Minimum	20	18	13	19	20	18.0
December—						
Maximum	51	55	57	56	46	53.0
Minimum	0	*1	18	9	2	5.6
Year—						
Maximum	98	100	99	96	97	98.0
Minimum	0	*1	4	*1	0	.4

*Below zero.

This table shows that the highest temperature reached at Salt Lake City during the five years was 100 degrees (July, 1892). The average maximum for the five years was 98. The average minimum is four-tenths of a degree above zero. The lowest point reached during the five years was 1 below zero.

RANGE OF TEMPERATURE.

The average monthly and yearly range of temperature at the points named below for the five years is as follows:

	Monthly.	Yearly.
Corinne	49.0	111.6
Fillmore	63.5	119.7
Fort Duchesne	59.6	121.4
Heber	62.3	115.6
Loa	63.0	113.9
Logan	53.7	109.6
Moab	56.9	106.2
Ogden	44.8	99.0
Parowan	57.9	103.2
St. George	60.6	104.4
Salt Lake City	48.2	97.6
Average	56.8	109.3

SENSIBLE TEMPERATURE.

There is another kind of temperature that we must not omit mention of in discussing Utah's climate, and that is the "sensible" temperature. In the humid States this sensible temperature might be called senseless temperature, when it comes to a comparison with Utah. The sensible temperature means the temperature that is actually felt, because we do not feel the degree of heat that the air thermometer indicates. For instance, the air temperature in midsummer may be 100, but the temperature actually felt by the body may be 25 or 30 degrees lower, depending upon the condition of the atmosphere and other things. We know that in certain sections of the country we feel the heat more than we do in Utah, though the thermometer may be higher in Utah.

To illustrate this difference in fact we may turn to the records of the warm spell of August, 1896, at New York City, and compare the same with the warmest month at Salt Lake City. The highest temperature at New York during that summer was 94 degrees, at Salt Lake City 96 degrees.

At New York there occurred during this week, as shown by the reports of the Health Department, 648 deaths from sunstroke, and in Brooklyn 215, while at Salt Lake City during the week ending July 14 no fatalities are recorded. At the former city a weekly maximum temperature of 90 degrees resulted in a frightful mortality, while a weekly temperature of 93 at Salt Lake City was not unduly oppressive. During the week ending August 22 there were 66 deaths from the same cause in New York, and 99 in Brooklyn.

It is a question of evaporation. Evaporation is a cooling process, and it is constantly going on from the surface of the body. The moisture that is perspired by the body is evaporated with greater or less rapidity; it is greater when the surrounding atmosphere, in addition to being warm, is also dry. Evaporation is also accelerated by the wind, and in a windy day the evaporation is greater, and there is a consequent greater cooling of the surface of the body. The use of a fan in an audience illustrates this fact. The action of the fan, no matter how vigorously applied and in what numbers, will not reduce the temperature of the auditorium. It sometimes increases the temperature of the preacher, but it will reduce the temperature of the person using it by accelerating the evaporation of moisture from the skin.

It has been found that the temperature of the wet bulb thermometer corresponds to the temperature of persons standing in the shade of trees and exposed to a natural breeze of at least six miles an hour; so that the wet bulb temperature, which is the temperature of evaporation, has come to be known as the sensible temperature, and the recording of this temperature alongside of the air temperature has now become a part of the work of the United States Weather Bureau observers. This departure from the usual custom of taking observations should be appreciated by the citizens of the arid States.

It is shown in this way that the sensible temperature of Salt Lake City corresponds to about that of Winnipeg, Manitoba, Sault Ste. Marie and Halifax during the months of July and August. New York City has a sensible temperature 10 degrees higher than Salt Lake City, or 65 degrees. At the same time, the maximum air temperature at New York is about 80, and at Salt Lake City 85. So that we have the phenomenon of a higher air temperature at Salt Lake City than at New York, but a lower sensible temperature. Salt Lake City's sensible temperature for July and August is about 55 degrees or a reduction of 30 degrees, due to evaporation. Chicago and Boston have each a sensible temperature of about 62 degrees, San Francisco about the same. San Francisco has a humid atmosphere like Chicago, and hence its sensible temperature is also high.

This is all very satisfactory to the arid region. It is seen that though the air temperature in our dry climate is considerably higher than that of the

humid States, the sensible temperature, the temperature actually felt by the human body, is so much lower in the arid region that it may be positively pleasant in the mountain valleys and at the same time decidedly oppressive, often fatally so, in the humid East.

It will, therefore, be appreciated that although the readings of the thermometer may be the same at sea level and in the altitudes on the same day, the sensible temperature of the two places will be widely different.

PRECIPITATION.

STATEMENT SHOWING THE AVERAGE MONTHLY AND ANNUAL PRECIPITATION IN INCHES, AT STATIONS OF THE UTAH WEATHER SERVICE SINCE RECORDS HAVE BEEN KEPT.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.	Number of years record.
Corinne	1.27	1.26	1.29	1.12	1.12	.58	.44	.31	.63	.84	1.07	1.80	11.73	24-26
Fillmore	1.47	1.68	1.65	2.25	1.11	.53	.51	.83	.98	.45	.73	1.41	13.60	6-8
Fort Duchesne	.38	.50	.71	.77	.79	.25	.48	.63	.60	.24	.23	.77	6.35	6-8
Heber	2.89	2.16	2.15	1.01	.95	.35	.75	.61	1.08	.94	.80	3.28	16.97	3
Levan	1.63	1.83	2.23	2.22	2.07	.69	.40	.77	1.39	1.04	.76	3.32	18.45	6-7
Loa	.57	.74	.63	.15	.33	.08	.87	1.08	.49	.46	.43	.45	6.28	4
Logan	1.55	1.52	2.05	1.12	2.06	.78	.27	.21	1.60	.30	.74	1.55	13.81	3-5
Moab	.68	.73	.86	.32	.33	.08	.64	.51	.72	.42	.59	1.07	6.95	6-7
Ogden	1.65	1.51	1.57	1.47	1.49	.58	.25	.40	.68	1.42	1.12	1.88	14.02	24-26
Parowan	1.27	1.56	2.03	1.35	.95	.17	1.09	1.06	1.04	.71	.57	1.00	12.55	5
St. George	1.01	.91	.60	.27	.33	.03	.33	.29	.41	.31	.44	1.38	6.31	11-15
Salt Lake City	1.46	1.31	2.01	2.24	1.76	.78	.55	.75	.91	1.60	1.48	1.68	16.53	29-23
State Average	1.32	1.31	1.49	1.19	1.11	.41	.55	.62	.88	.73	.75	1.63	11.96	.....

Those interested in this subject will bear out the assertion here made that Utah thus discussed and illustrated by the foregoing tables will be an interesting study to those who make good climate a condition precedent to permanent location. All of the tables and much of the foregoing discussion was prepared by Prof. James Dryden of the State Agricultural College, to whom credit is here given. Truly, there is no better climate in the world than that of Utah and the famous Salt Lake Valley. As Utah has varying altitudes, so Utah has varying climates, and from the stock on hand a perfect fit is guaranteed. In Northern Utah, where the altitude is between 6,000 and 7,000 feet, the winters are longer and colder, and the summers shorter and cooler. In Salt Lake City, where the altitude is 4,260 feet, autumn and spring rob winter and summer of many of their opening and closing days. The Great Salt Lake, with its peculiar influence, tempers the severity of all seasons, and makes them genial and pleasant. At Salt Lake the average summer temperature is 72 degrees, and the average winter temperature 32 degrees. On an occasional day in summer, perhaps once each year, the mercury reaches 100 degrees, but it seldom falls below zero, and when it does, 4 degrees below is the usual limit. On any summer day, with a good horse, the resident of Salt Lake City can, by driving up any one of its picturesque cañons, obtain, within two or three hours, all of the different climates in the category. The limits of his drive may be the eternal snows on the one side and the flowers blooming on the banks of the Jordan on the other. In Washington County, Southern Utah, where the altitude is only a few hundred feet above sea-level, the climate is semi-tropical. There geraniums and other

tender plants thrive out of doors throughout all the winter season, and figs and almonds are grown. Saint George is the chief city in this region, and the time is coming when it will be the Mecca of seekers for a perfect winter home.

It is a safe assertion to make that no one in Utah is dissatisfied with Utah's climate, and that when the wonders of it are better known the State will become the abiding place of thousands who are wearied with the rigorous climates of other portions of the United States. The funnel-shaped cloud which comes without warning and scatters ruin and death along its trail, has never invaded Utah. A safe barrier against the approach of this dreaded monster of the air is the mighty system of mountains which encompass Utah about. Here are some interesting facts gleaned from the records of the United States Weather Bureau at Salt Lake:

The average velocity of the wind per hour is 5.2 miles. In Boston it is 9.2; in Sandusky, Ohio, 12.8; in St. Louis, 9.8; Cheyenne, 10.6; Denver, 6.3; San Francisco, 9.3. This velocity is less in winter than in summer. High winds are very rare, whereas in many Eastern cities a velocity of 60 to 70 miles per hour is frequently recorded. Damp winds are unknown. The relative humidity is 48.3. In Los Angeles it is 66. In New York it is 68. The mean temperature at Salt Lake for 1900 was 54 degrees, or three degrees above the normal. The annual average mean range of temperature is 51.5; the average monthly range is 47, and the average daily range is 20.2. This means that we have spring, summer, autumn and winter. Showers and blossoms in spring, warmth and fruitfulness in summer, bracing open weather in the autumn, and snowfall and frost, sleighing and skating in winter. Professor Jones says:

"It is undoubtedly true that the climate where there is no difference beless than 90 degrees than it is more than 100. At Montral the annual range tween Christmas and the Fourth of July, where every day is like every other, except for the dust, is a first-class place to die in, but to live we want a climate that will hold up all our energies, that will bring out all our powers, and keep us alive and progressive without making us suffer because of its rigor. This we have in Utah."

The records show that the extreme yearly range of temperature is oftener is 140 degrees; New York City, 114; St. Louis, 113; Chicago, 132; Denver, Colo., 126. The number of clear and sunshiny days at Salt Lake averaged for twenty years was 287. Winter seriously begins about Christmas time, and ceases about the 1st of March. The first light frost generally comes early in October, and there is none later than April. With these general observations, the writer offers the testimony of individuals familiar with the climate of Utah, and of eminent physicians who have made it and its effect upon diseases a study.

Prof. Marcus E. Jones reviews the climate of Salt Lake City for a single year as follows:

"Suppose a stranger comes here from the East; the first thing he notices is the buoyancy and elasticity of his step; he can hardly get enough air into his lungs, and he expands them and takes long draughts with as much relish as he would do so much cool water when nearly famished with thirst; his clothing feels warm and dry, all his vital powers are quickened, and he enjoys everything with a keen relish. Suppose he comes here in October. The air is delightful, just cool enough to give spice to everything. At first the day temperature runs from 70 degrees up to 80, but each day it grows a little cooler. The skies are clear, and just as the haze is beginning to accumulate we are favored with a shower, which clears the air and drops about a quarter of an inch of rain in the valley, and tinges the lofty mountain peaks with white. These showers occur on an average once a week during October. Following the rain we may have a slight frost, which gradually tains, till at length the painting is gorgeous wherever the eye falls upon the turns the aspens into gold and the maples and oaks to crimson on the mounhills. Each day is a little cooler than its predecessor, but there are no chill-

ing blasts, no snow, nor drizzling and drenching rains; it is more like the Indian summers of the States, but with far less haze. October shades off into November; the showers come every four or five days, but not so much in quantity each time; the snow creeps down the mountains; the night temperature goes to or a little below the freezing point, and the day at first is about 45 degrees, but gradually lowers to 32 at the close of the month, while the night is from 5 to 10 degrees lower, but yet no storms other than the brief showers. The streets continue dusty through this month and up to Christmas. December is a continuation of the preceding month, but still colder, with showers or, rarely, a flurry of snow, seldom exceeding a tenth of an inch at a time, but coming every third day till Christmas, when, either just before or just after it, we have our first snowstorm, which ushers in our 'cold snap,' as Salt Lakers call it, which last for two or three days, or even a week, when the thermometer goes down nearly to zero for a night or two. Sometimes our cold spell comes in November and sometimes in January. In January the flurries of snow come every third day, sometimes melting as fast as they fall, and at other times remaining on the ground till we have four or five inches, but the snow soon melts off, so that by the close of January the ground is bare and spring weather begins. During the whole of our six weeks of what we call winter there are no blizzards. The sun is shining brightly most of the time, and the cold is quite steady, what there is of it; the mean daily range is about 20 per cent. less than that of Los Angeles during the same time. In the early part of February there are more or less falls of snow, that usually melt as they fall, but by the middle of the month flowers are generally in bloom on the bench back of the city. The number of rainy or snowy days is about the same as in the preceding month. What wind there is comes from the south or east, and is warm. The average movement is less than five miles per hour. March warms up gradually; there are about two showers per week in the valley, and if they come in the night there is a little snow on the ground at sunrise, but it is gone quickly. The streets soon get dusty, only to be moistened up by the next shower, and by the latter part of the month, or the first of the next, the fruit trees are in bloom and the gardens are all made. The wind movement is less than five miles per hour. We do not experience those proverbial March gales so common in the East. The average temperature has now risen to nearly 60 degree. With the advent of April come the warm showers, averaging a quarter of an inch at a time, and coming a little more often than twice a week, but lasting only a few hours at a time. The warm south winds also help greatly to bring all the vegetation into full blast. By the 8th of the month the last frost has come and gone. The wind is but slightly over five miles per hour. Everybody looks for the showers with delight. A hard clap of thunder is a curiosity. No one fears a tornado, for we never have any. The drizzling rains, lasting for a week, and the somber clouds obscuring the sun for many days, we never have. Fogs occur perhaps once or twice for a part of a day during the year, enough to show us what we have escaped by coming to Utah. In May there is one shower a week, and on a number of other days we have little sprinkles. By the close of the month the temperature has risen to 70 degrees, and the bathing at the lake has begun. In June there are three showers every two weeks. The daily temperature has risen to 75, and even 80 degrees, by the end of the month. The wind movement still continues about five miles per hour. The snow has disappeard from all the mountains, the streams are running full with water from the melting snows, fruits begin to ripen, the crops are coming on excellently, the schools are closing, and everybody is getting ready for the summer holidays. Before the month is up there are many camping parties scattered all through the mountains, fishing, hunting and enjoying the cool and even frosty nights, while those remaining in the city are going by thousands daily to enjoy the delicious bathing in the lake. In July there are about two showers every three weeks. The average temperature is abou 76 degrees, and the night temperature often goes below 60 degrees, so that there is seldom any inconvenience

or difficulty about sleeping well. The dry air, which gets heated up during the day, cools off rapidly as soon as the sun goes down. August has more showers than July, and is cooler. September is still cooler than August, and is about as showery. People begin to return from their vacations refreshed and ready for another year's work. This is the round of Salt Lake's climate, and it differs but little from year to year. One great feature of our location is our proximity to the mountains, where we can get any weather we may desire. Suppose a person should become tired of the summer weather, as is very liable to be the case in the East. His only solace there is that it cannot be helped, and he must sweat it out; but here all that is necessary is to ride twenty-five miles on the train, and he is in the heart of the mountains, at an elevation of 8,500 feet above the sea, where it is so cool that it freezes every night in the year, and so he can roll up in several blankets and enjoy nature's sweet restorer, sleep. The value of such opportunities cannot be reckoned nor overestimated in comfort or health. Is it any wonder that Utah people are proud of their climate and position, which combine the advantages of the seacoast (bathing), the cool mountain retreats, the products of agriculture and the conveniences of advanced civilization all in one? How pleasant it is to camp in the mountains or fish and hunt with the knowledge that we shall not be troubled with mosquitoes, gnats, fleas or jiggers; that there will be no dews, or very little, to wet our feet and clothing; that if we are caught in a storm it will last but an hour or two, and then clear off as fine as ever; that if the sun gets too hot we can stand in the shade for a few minutes and cool off to our satisfaction, and that on our return from the day's jaunt we can be sure of a refreshing sleep and full recuperation for the duties of the morrow!"

Doctor Standard, for many years an authority in Utah upon the climate of the State, speaks of it as "the most unique and wonderful climate on the face of the globe."

TABLE

Of Mean, Extremes and Range of Temperature Annually and Amount of Precipitation for Period Extending from 1875 to 1897, Inclusive, Prepared by the Observer of the U. S. Weather Bureau at Salt Lake City.

Years.	Temperature.			Precipitation, Inches.
	Mean.	Maximum.	Minimum.	Range.
1875	51.3	101	5	96	23.64
1876	50.6	97	7	90	21.28
1877	51.0	98	3	95	16.35
1878	51.3	97	5	92	19.75
1879	53.2	97	—10	107	13.11
1880	54.0	95	2	93	10.94
1881	51.5	100	2	98	16.88
1882	49.2	96	0	96	15.98
1883	50.8	100	—20	120	14.24
1884	50.9	93.2	—13	106.2	17.52
1885	52.3	100.3	4.6	95.7	19.69
1886	51.6	99.1	—2.9	102.0	18.89
1887	52.7	97.9	8.7	89.2	11.66
1888	53.0	98.2	—16.7	114.9	13.62
1889	52.7	102	5	97	18.46
1890	51.3	100	—6	106	10.33
1891	50.6	98	0	98	15.92
1892	52.7	100	1	101	13.35
1893	50.2	99	4	95	17.35
1894	50.8	96	1	97	15.27
1895	50.2	97	0	97	11.95
1896	51.5	97	—2	99	18.42
1897	50.2	98	2	96	16.74
Average	51.5	98.1	—9	94.8	16.15

Dr. Thomas J. Mays states: "It may be truthfully said that there is no other element in our environment which modifies the bodily structure more palpably than mountain elevation. This influence pertains especially to the

respiratory organs, and is principally, if not entirely, exerted by the thinness or attenuation of the atmosphere, and by a diminution of air pressure on the outside of the body. It is estimated that, at an elevation of 6,000 feet, the air contains about 25 per cent. less oxygen than it does at the seashore, and that the body is relieved of nearly 7,000 pounds of outside pressure. Hence, ascending into a rarefied environment, the pulse is accelerated from fifteen to twenty beats per minute, the respiration is quickened, in order to obtain the required amount of oxygen, and evaporation from the skin and lungs is increased. Protracted residence in such a region enlarges the chest capacity to a marked extent."

Doctor Niles says: "The physiological action of the climate is that of a strong stimulant tonic to the whole constitution, and especially to the nervous system. It is difficult for one who has never experienced the effects by coming from a low to a very high place to understand the wonderful exhilaration that follows breathing this dry, rarefied air. Those in health feel and enjoy the powerful tonic—almost intoxicating—effect, but not to the marked degree that the invalid does. It seems to supply a necessity in his case; nor are the effects limited to a temporary stimulant, to be followed by a corresponding depression. Very soon his appetite is better, his digestion improves, the feeling of lassitude disappears, exercise becomes a pleasure, and he is able to enjoy the outdoor life to which he is invited by new scenes, sunny skies and bracing air. With the increased exercise there is a more rapid gain in weight and strength.

"Dryness, equability, plenty of sunshine, absence of high winds, and coolness are all valuable and necessary high-altitude climatic features, and no place should be chosen where these conditions do not exist. But it is undoubtedly the stimulus of the lessened atmospheric pressure that exerts the most profound influence, and, more than anything else, it is the adaptation of this factor to the needs of the patient that decides the result."

AVERAGES AT SALT LAKE CITY OF EACH MONTH FOR SEVENTEEN YEARS, OF SEASONS AND YEARS.

YEAR.	Temperature.					Wind.				Precipitation.		
	Monthly Mean.	Mean of Highest in each Month.	Mean of Lowest in each Month.	Mean of Extreme Monthly Range.	Mean of Extreme Daily Range.	Mean Daily Range.	Prevailing Direction.	Average Hourly Velocity.	Total Movement.	Mean Relative Humidity.	Rainfall, inches.	Average Cloudiness. [0.10]
December,..	33.3	51.1	13.6	44.7	25.0	14.6	S E	4.1	3,032	65.9	1.73	5.7
January,....	28.0	47.2	10.5	48.1	24.3	15.7	S E	4.1	3,155	63.8	1.48	5.1
February....	33.6	53.1	13.6	46.1	26.5	15.7	S E	4.6	3,163	61.7	1.35	5.2
March.....	41.9	65.5	23.3	47.8	32.6	18.5	N W	5.5	4,151	53.7	2.00	4.9
April	49.9	72.5	31.0	47.0	35.2	20.1	N W	6.1	4,435	49.7	2.39	5.0
May.....	58.1	82.7	37.4	50.0	38.8	22.2	N W	6.3	4,647	45.7	1.66	4.3
June.	67.4	90.9	45.2	49.9	40.4	24.4	N W	6.2	4,425	39.5	0.77	3.1
July.....	75.7	95.4	53.6	45.9	41.5	24.8	N W	5.6	4,131	37.4	0.40	3.2
August.....	75.0	95.0	52.5	46.7	40.4	24.1	S E	5.5	4,418	37.5	0.75	3.1
September..	64.6	87.1	43.3	49.5	39.5	23.6	N W	5.4	3,846	38.2	0.88	2.8
October.....	51.9	75.6	30.8	49.6	35.0	20.5	N W	4.9	3,630	47.6	1.67	3.7
November...	39.2	61.6	18.6	46.2	30.0	17.5	N W	3.9	2,815	56.3	1.36	4.4
Average of Each Season.												
Winter.....	31.6	50.6	12.6	46.3	25.3	15.3	S E	4.3	9,350	63.8	4.56	16.0
Fall.....	51.9	73.6	30.9	34.8	34.8	20.5	N W	4.7	10,291	47.4	3.91	10.9
Summer.....	72.7	93.8	50.4	47.5	40.8	24.4	N W	5.8	12,674	38.1	1.92	9.4
Spring.....	50.0	74.8	30.6	48.3	35.5	20.3	N W	6.0	13,233	49.7	6.05	14.2
Year	51.5	73.1	31.1	47.2	34.1	20.1	N N W	5.6	45,548	49.7	16.44	50.5

The above table, prepared from the records of the Signal Service, exhibits the average of the extreme range of temperature, not of the maximum and minimum of each day in the month, but of the single highest and lowest reading in each month, and also of that day in each month on which the range was greatest; the mean temperature by months; the mean daily range; direction and velocity, and total movement of the winds; relative humidity; precipitation, etc., by months, period of observation covering seventeen years. The figures under the head of "average cloudiness" give the total actual cloudiness from daily observations. For the purpose of observation the day is divided into tenths, the cloudy tenths noted, added together, and divided by the number of days in the month. Thus the figures represent not 50.1 full cloudy days in the year, but the equivalent of 50.1 full cloudy days distributed throughout the year.

ATTRACTIONS.

Utah, costumed in the gray of her mountain sides and the green and gold of her fertile valleys, her head crowned with the white of the never-melting snows, and glorified with tints from the palette of the sun; her bosom decked with the beautiful jewel, her mysterious and salty sea; with her rivers winding like ribbons of silver about her showy form, and her lakes and springs sparkling amid the undulations of her wondrous attire—is an attraction in herself.

THE GREAT SALT LAKE has long been accounted one of the marvels of creation. Baron La Hontan, in 1689, gathered from the Western Indians some vague notions of its existence. His imagination led him to tell strange tales of a bearded people who dwelt in powerful cities on its fertile shores, and navigated its briny waves with boats 130 feet long. About 1776 Father Escalante reached Utah Lake, and was there told by the Indians of another and greater lake to the north, the waters of which were "noxious and extremely salt," producing "an itching sensation in the moistened part." In 1820 Mr. Miller, of the Astor party, saw and visited the lake, and the same year Prevost trapped in its vicinity. In 1824 James Bridger looked upon its waters, and to him, according to some writers, belongs the honor of its discovery. In 1826 four trappers sailed around it in hide canoes, searching for beaver. In 1831 or 1832 Captain Bonneville examined and wrote an account of the lake. Washington Irving thereupon gave it the name of "Lake Bonneville," which it bore until 1843, when John C. Fremont, with Kit Carson and others, explored it, determined accurately its latitude and longitude, and gave it the name which it now bears. In 1847 the Mormon pioneers laid the foundation of Salt Lake City on its shores, and since then all that is known concerning its peculiarities has been given to the world. Much speculation has been indulged in as to its origin. Geology has traced far up the mountain sides, from Idaho to Arizona, the high-water line of an ancient lake, to which the Government has lately given the name "Lake Bonneville." Some say this ancient lake shrunk gradually as the centuries retreated, the saltiness of its waters increasing in the proportion that evaporation exceeded inflow, until Utah's Dead Sea is all that is left of old Lake Bonneville. Some say it was once a fresh-water lake, and that inflowing saline streams have given it its present density. But it is idle to speculate on this subject. Utah has the lake, and numbers it among the greatest benefactions she has received from nature's hand. The area of this body of water varies with the seasons. Having no outlet, it loses none of its volume except by evaporation. Its waters ebb and flow as the seasons are wet and dry. Since the settlement of the pioneers the extremes have been, lowest water in 1867, highest water in 1887. Owing to these variations, it is impossible to give an accurate statement of the width and length of the lake. Professor Jones says it is seventy-five miles long by fifty miles wide, in the widest place, and that it is

350 miles in circumference. Two thousand five hundred square miles is its generally accepted area. Its average depth is about fifteen feet, and its greatest depth about thirty-three feet, though these depths vary in different years. In density the lake is about 20 per cent. solid matter. This also varies with the oscillations, being greatest when the lake is shallowest. Three rivers and several small streams comprise the inlets. The water is a beautiful green, and so clear that objects can be distinctly seen at a depth of from fifteen to twenty-five feet. Ordinarily the surface of the lake is placid, but it has "times of noble energy," as well as "times of perfect peace." Occasionally storms rage over it, and then its waves roll high and dash upon the shore with almost the force of the waves of old ocean. Tales have been told of schools of whales that disport themselves in the waters of the lake, but these are fables. Nothing lives in the lake except a minute shrimp, from one-quarter to one-half an inch in length, which Professor Jones compares to "a small minnow with a feathery tail." Of the feathered tribe none seek the lake but the seagull, of which there are thousands. These describe graceful circles above it, or dance upon its billows, seeking at certain seasons the mountain islands, of which the lake has eight, and there hatching and raising their young. Upon the climate of the surrounding region this strange body of water exercises a peculiar influence, tempering the extremes of summer and winter, and giving to the air a delightful softness. Residents for 250,905,600,000. Estimating this vast volume of salt at the present market price, he gives it a total value of $103,483,296,000. This salt, the same many miles about it enjoy the anomaly of a sea breeze at 4,000 feet above the tide. The lake's value to Utah, in a material sense, is known to be very great. Thousands of tons of salt are evaporated from its waters every year by companies operating plants along its shore. This salt finds its way in a crude state to the stock ranges of the West, and vast amounts of it are consumed in chlorodizing the ores of "Silverland." Much of it is refined and sold for table and dairy use. To compute the present value of the salt it contains is to drive mathematics to the limits of endurance. A writer in the *Utahnian* states the number of cubic feet of salt in the waters of the lake to be writers says, loaded in cars, ten tons to a car, would fill 958,424,960 cars, and make a train long enough to reach over 200 times around the earth.

But to appreciate the grandeur of the lake, and the blessing it is to the people of Utah, the reader should visit Garfield Beach, where thousands annually lave in its briny waters and float upon its buoyant waves. Garfield is a model pleasure place. The architecture of its commodious and well-appointed structures is in every way attractive. A beautiful dancing and observation pavilion is situated out in the lake, several hundred feet from the shore, and here the finest music is furnished for dancers. On the shore are restaurants, drinking places, shaded walks and all the other accompaniment of a well-conducted resort. Close at hand is a roomy, open pavilion, wherein summer opera is given and other stage amusements presented. Garfield is the only resort upon the lake having a sandy shore, and the great patronage it receives from women and children is due in part to this circumstance. Beyond the pavilion the luxury of deep-sea bathing may be had, but near the shore the water murmurs over the shallows, and there the timid and the untried, the ladies and the babies, may watch—

> "The waves that reach
> Their jeweled fingers up the sanded beach,"

and alternate between a bath in the velvety sand and in the waters along the shore. Much has been written descriptive of the bath in the Great Salt Lake, but neither pencil nor pen can adequately describe it. Those who indulge in in it have a sense of perfect security and strange exhilaration. Strengthened by the salt, the arms of the waves bear the bather on their surface. While the men lie prone upon their backs with folded arms, and smoke as the waters rock them, and the women grace the swelling bosom of the sea with their

floating forms, the happy children play and paddle in the shadow of the piers. But the pleasure of a visit to this delightful resort does not cease with the bath it affords. The lover of nature will here find a scene of exquisite loveliness. Behind the pavilion, and yet so near that a walk of five minutes will plunge you into the cooling depths of the cañons that seam their sides, rise the lofty, picturesque and cloud-festooned peaks of the Oquirrh. Stretching away in the other direction are miles of the green, island-dotted surface of the lake, beyond which, mellowed by distance, are the far-off summits of the mountains that fringe its western brink. To the south sweeps in graceful circles the shore line, and to the north lies the many-hued and fertile valley of the Great Salt Lake, with the "City of the Saints" in the distance. Garfield is easily reached from Salt Lake City. Another lake resort near Salt Lake City is Saltair Beach. The Syracuse bathing resort is much patronized by the people of Ogden and the surrounding country, and the bathing there afforded is in every way delightful.

Hot Springs.—These curative agencies of nature are found in many portions of the State; indeed, so common are they that they are convenient to almost every settlement of importance. Ogden maintains a fine establishment a few miles north of the city. Salt Lake City has three different bathing places where you can boil out in waters heated over nature's furnaces. Beth's Hot Springs are four miles north of the city, and are much resorted to by invalids and pleasure-seekers. The Warm Springs, within the settled limits, enjoy a large patronage. The chemical elements in these several springs do not differ materially. Their waters contain such ingredients as chloride of sodium, iron, sulphur, magnesia and lithia, and possess peculiar healing qualities. The ailments most relieved by them are rheumatic, kidney and stomach troubles. The temperature of the different springs vary, some being as low as 95 degrees, and some reach as high as from 128 to 140 degrees F. The springs of Ojo Caliente, of Glenwood and of Arkansas have long been resorted to by invalids of the Eastern States, but the hot springs of Utah are equally efficacious, and when their wonderful curative properties are better advertised they will attract to the State many invalids and pleasure-seekers.

Utah Lake, a beautiful sheet of fresh water near Provo, must not be omitted from the list of Utah's attractions. The lake is the source of the River Jordan, which meanders among the grassy fields of the Utah and Salt Lake valleys, and flows into the Great Salt Lake. Boating is a popular amusement on Utah Lake, and during the hunting season hundreds of duck-hunters and myriads of ducks visit it. The lake is stocked with black bass, whitefish, trout and common food fish, and is resorted to by the State's fishermen. The lake receives the waters of the American Fork, Provo and Spanish rivers, is twenty-five miles in length by five miles in breadth, and is encircled by picturesque mountains. Around its shores is exemplified, perhaps more perfectly than in any other part of Utah, the high degree of success attained by the Utah farmer.

Mountain Resorts.—With these the State is bountifully supplied. In the vicinity of almost every settlement of importance are deep cañons wherein the people at home, as well as those from abroad, seek, in the summer season, the coolness and pleasure of camp life. Near Salt Lake City, high up the mountain sides, on the shores of mountain lakes, or on the banks of mountain streams, summer hotels are conducted for the convenience of those who prefer to have all of the recreation and none of the labor incident to summering in the mountains. It may be said that wherever there is a mountain in Utah there is also an interesting cañon, and the searcher for a spot in which to summer will find no difficulty in suiting his taste, no matter how critical it may be.

The Hot Pots.—Near Park City will be found a natural curiosity of Utah, called familiarly "The Hot-Pot Region." Here innumerable hot

springs have built up around their mouths cylindrical-shaped affairs which very much resemble inverted pots, from the top of which overflow the waters of the springs. These pots, some of which are many feet high, are scattered all over the surface of the country, and present a singular and interesting spectacle. This region is annually visited by many strangers, who indulge in bathing and mountain-climbing.

Fishing and Hunting.—The angler will find in Utah ample opportunities to indulge in his favorite sport. The mountains streams are stocked with gamy trout and the but little less gamy black bass abounds in the waters of Utah Lake. In season good duck-hunting can be had on Utah Lake, the Jordan and around the pools and lagoons of the Salt Lake Valley. On the mountain sides grouse are plentiful, and now and then a deer is seen, but to find any amount of larger game the hunter must seek the mountain ranges of the Uintah and Uncompahgre reservations. Salt Lake City is the usual outputting place for fishermen and hunters, and most of the fishing and hunting grounds can be conveniently reached over the Oregon Short Line. There are many other attractions in Utah which cannot be particularly described in this book, but which can be easily found by the pleasure and health seeker. During the summer season the Oregon Short Line runs frequent excursions from points along its line to the different resorts of the State. These excursions are popularized by cheap rates and a liberal ticket limit.

THE MORMON QUESTION.

The Mormon question belongs largely to the past. It has long since ceased to be a frequent subject for discussion. Once in a while in the midst of political excitement it breaks out and is talked of for a time, but interest in it soon subsides, and the people, Mormon and Gentile, continue their trade and social relations, which every year are more firmly established. The question no longer affects the State's future growth or prosperity. The hatred and uncharitableness once provoked by it have passed away, and but for the fact that there are in the East persons who still believe that it is a factor in the social, religious and business life of the State, the discussion of the question might well be eliminated from every book and article concerning Utah. It is confessed that during the first thirty-five years of Utah's Territorial existence the relations between the Mormons and the Gentiles were more or less strained. How could they well have been otherwise? The Mormons had fled from what they believed to be the persecutions of the Eastern people, and, unmindful of the danger of the effort, had moved 1,000 miles into the wilderness, there to build up a commonwealth wherein they could manage their own affairs—business and governmental. Naturally, they felt a proprietorship over the region they occupied, and looked with disfavor upon the coming of those whose religious belief and methods were different from their own. Again, the Mormon creed, as then professed, was in many important respects entirely at variance with other religious creeds of the United States, and its influence early became apparent in local, social, business and governmental affairs. For many years after the first settlement was made the Mormons were alone in the wilderness, but the discovery in and around Utah of great deposits of valuable minerals, and the building of the Union Pacific into the West, attracted to their country the adventurous spirits who, during that period of Western development, were breaking over the border line of civilization and blazing trails for those who were in time to follow them. The new-comers were Gentiles, and with their arrival began the friction which first called attention to the Mormon question, a question which for many years, more than anything else, retarded Utah's progress. This friction resulted from Gentile antagonism to Mormon political control, to polygamy and to the alleged teaching by Mormon leaders of the supremacy of the church over the State. National politics at this time re-

ceived no attention, but two local organizations—the People's party, representative of the Mormon element, and the Liberal party, representative of the Gentile element—for over thirty years contended for political mastery. The animosities engendered during this long period need not be discussed here, as they have long since passed away. For many years before the long conflict closed it was apparent that these animosities were decreasing, and that the contending classes were gradually drawing nearer together. These signs indicated the beginning of the end, and the end came when the Mormon people disbanded their party, surrendered polygamy and proclaimed the perpetual dissolution of church and State. These concessions were at once received by the mass of the Gentile people in the spirit with which they were made. The Liberal party disbanded with but one dissenting vote, old antagonists shook hands, old hatreds were dissipated, and there began in Utah an era of peace and good will far more perfect than could have existed had it not have been preceded by years of conflict. Today no one well informed about Utah will dissent from the writer's statement that there is not elsewhere in the United States a more loyal, progressive and law-abiding people than the people of the "Forty-fifth State." The name "Gentile" and "Mormon" are seldom now heard in Utah. The two classes intermingle in social and business affairs, and are united in effort to further the growth and herald abroad the glory of the State.

SCHOOL SYSTEM.

Bancroft Library

In 1890 the Legislature of Utah enacted a law establishing a system of free public schools for Utah. Prior to that time the children of the State were dependent upon sectarian schools or upon schools supported to a greater or less extent by tuition charges. The law of 1890 has been followed by other legislation, the effect of which has been to give the State as perfect a public-school system as is enjoyed by any other State in the Union. Space will not permit the discussion of the details of this system. It is enough to say that the schools of Utah are already far-famed for their excellence, and that they have attracted to the State from the surrounding States and Territories many thousand people who desire to have their children receive instruction therein. In Salt Lake City the school property acquired since 1890, and now held by the school board, is valued at $1,098,451.85. This sum is represented by twenty-six commodious, modern, thoroughly ventilated and completely equipped palatial school buildings, wherein the most improved methods known to the science of education are daily employed. The present enrollment of the Salt Lake City schools (January 1, 1901) is 12,584. The growth, not only of the schools, but of Salt Lake, since 1890 will be appreciated when the statement is made that the enrollment of 1890 was 6,368, representing 72 per cent. of the entire school poulation. The astonishing development of the public-school system as a result of the law of 1890 is, however, not confined to Salt Lake City. Every school district in the State can make proportionately an equally good showing. Utah is justly proud of her common schools, which will influence to a marked degree her future growth and the intellectual development of her people. The total school population (1900) was 84,419; total value of all school property, $2,932,745.14.

The State University.—This institution is located at Salt Lake City, on a sightly eminence east of the limits. The grounds, sixty acres in extent, were set out of the Fort Douglas Military Reservation by a recent Act of Congress. Two hundred thousand dollars of State appropriations have been expended within two years in erecting normal, physical and library buildings, which are attractive and modern, and which are in general use pending the completion of the scheme of construction, which includes several additional structures. This institution is supported by the State, and furnishes instruc-

tion in all branches of popular education. It has a thoroughly-equipped chemical laboratory, a gymnasium and museum, the latter having received from the Utah World's Fair Commission the gift of Utah's mineral exhibit at the World's Fair, which makes it of great value to those seeking instruction and information upon the mineral resources of the State.

The State Agricultural College at Logan has thirty-two professors, a strong attendance and buildings attractive and adequate.

Other schools, academies and colleges have been mentioned elsewhere in this report.

RELIGION.

The belief is still much too general that the creed of the Latter-Day Saints is practically the only religion professed in Utah, and the question is frequently asked, "Will I have an opportunity of attending my own church if I remove to your State?" To this the answer can be made, "If you belong to any of the religious societies usually present in the cities of the United States you will find your church there." The Mormon people have many meeting-houses, and have built four magnificent temples wherein they teach their followers and conduct their peculiar services, but in almost every city and town in the State other denominations have their houses of worship. Salt Lake City is a city of churches, and some of the edifices would be a credit to the larger cities. Sunday schools are conducted by all of the different denominations, and the religious tone of the people is as pure as in any other place in the country.

SOCIAL AFFAIRS, ART AND AMUSEMENTS.

A more music-loving and pleasure-seeking people than the people of Utah will not be found elsewhere in the United States. Salt Lake sent to the World's Fair its great Tabernacle choir, where it competed in open contest with the greatest choirs in the world—securing the second prize. This choir is said to be the largest company of church singers in the world, and its fame has extended throughout the nation. One of the teachings of Brigham Young was that the people must be amused, and so in the very dawn of Salt Lake's history the Home Dramatic Association, an association which lives to this day, was organized. This company of players entertained the people throughout all the trying times of the city's infancy, and many of its actors became celebrated. In 1862 the Salt Lake Theater was built, an amusement house theater seats 1,700 people, and Booth and other great actors spoke their lines from its stage when to visit Salt Lake meant a long and tiresome stage ride from the Missouri River. In this theater "the Immortal Artemus" gave one of the last lectures he delivered in America, and in Salt Lake he gathered the material for his quaint account of "The City of the Saints," which he gave to delighted London almost up to the very day of his unhappy death. Utah which then and now compares favorably with any in the United States. This has given some distinguished artists to fame. Dallin, whose work as a sculptor has passed the scrutiny of the art critics of European salons, was born and raised in Utah. Maud Adams, the charming actress, first saw the light in Utah, and began, when a child, her artistic career in the Salt Lake Theater. There are at this time two opera-houses in Salt Lake, one in Ogden, one in Logan, one in Park City and one in Provo, all of which are commodious and properly equipped for the appearance of large companies. Utahians are imbued by long years of training and opportunity with the desire for relaxation. This is evidenced by their enthusiastic patronage of their amusement houses, by the encouragement they give to societies organized for pleasure purposes and by their daily visits in season to their lake and other

resorts. In all social matters they are up to the standard in every way. Inviting the people of other States to come and live among them, they make acquaintance easy and hasten to extend to every new-comer the fullest hospitality. All religious classes mingle without friction, and a place in society is always open to the deserving.

THE CITIES AND TOWNS OF UTAH

have been described with some detail in the portions of this book devoted to the mining and agricultural resources of the several counties. The towns and cities of 2,000 or more population, stated in the order of their rank, according to the census of 1900, are as follows:

Salt Lake City, Salt Lake County	53,531
Ogden, Weber County	16,313
Provo, Utah County	6,185
Logan, Cache County	5,451
Park City, Summit County	3,759
Springville, Utah County	3,422
Murray, Salt Lake County	3,302
Eureka, Juab County	3,085
Brigham City, Box Elder County	2,859
Springville, Utah County	2,735
American Fork, Utah County	2,732
Lehi, Utah County	2,719
Payson, Utah County	2,636
Mill Creek, Salt Lake County	2,496
Pleasant Grove, Utah County	2,460
Manti, Sanpete County	2,408
Mt. Pleasant, Sanpete County	2,372
Mercur, Tooele County	2,351
Nephi, Juab County	2,208
Ephraim, Sanpete County	2,086

Besides these there are many thriving villages throughout the agricultural and mining districts having a population of from 500 to 2,000 souls. These villages are all well governed, have good business houses, and many of them are supplied with fire apparatus and other municipal conveniences.

SALT LAKE CITY.

On July 24, 1847, in the morning, after the first band ("The Immortals") of Utah pioneers had unyoked for the last time on their memorable journey their tired oxen, Salt Lake City was founded.

The story told is that Brigham Young, under whose leadership they were, and whose genius was later to be written on every page of the history of early trans-Missouri settlement, planted his cane on the eminence now crowned with the most wonderful of all Mormon edifices, and said, "Here will we build the temple of our Lord." Since then the great Empire of the West has been growing, and all the while Salt Lake has looked on at the upbuilding and measured its progress day by day and year by year by its growth. From the beginning it burned its little light of civilization far out in the wilderness and encouraged onward with its beams those who were to redeem the wastes. It was present when the treaty of 1848 gave us our possessions from Mexico. It witnessed the map-making of half a continent and saw the lines of the great Western States marked out. It was a sturdy infant when Marshall discovered gold, and in its 'teens when Denver was born. It welcomed the first pony express rider on his way to the Pacific, and received Ben Holliday's first overland coach. Its toilers erected the poles and strung the wires on the first transcontinental telegraph line, and built the last section of the road which as the great Union Pacific now links Omaha to

San Francisco. With all this in its background, may not Utah's capital justly claim a place among the historic cities of our country?

Viewed today, Salt Lake is one of the most beautiful cities of the United States. Artists with pen and brush, kodaks and cameras, have pictured the exquisite scenes within and around it. Its founders and all followers of their religious faith attribute to God's direction every act of their lives, every result of their effort, and when one contemplates the marvelous beauty of Salt Lake's situation and considers the extraordinary diversity of rich resources surrounding it, the thought comes to him that a Guiding Hand greater than that of any man must have had to do with its creation.

The city lies about midway between San Francisco and Denver. The majestic peaks of the Wasatch tower above it on the east, and the lovely and fertile valley of the Great Salt Lake stretches away towards the west in vernal billows.

As a commercial and railroad point Salt Lake has no competitor in the inter-mountain country. Indeed, it may be said in every sense to be the center of that great region. It is the headquarters of many great mining companies, and is the location of some of the largest smelters and mineral mills in the West. From it is distributed the products of the farmer and manufacturer, and its wholesale houses send their goods for hundreds of miles in every direction. It is, and always will be, the chief city between Denver and San Francisco. That its future growth will be rapid and substantial no one who reaches an understanding of its resources and attractions will deny. No mining, agricultural or industrial development can occur within 500 miles of it in any direction without favorably affecting the city's growth. No transcontinental railroad to be built through the center of the republic can avoid it. To it must inevitably come, either directly or indirectly, a vast tribute of trade from Utah and the surrounding States. Money paid out for labor in the thousands of mines within its immediate mineral domain will always flow in a steady stream to Salt Lake. These are its general advantages. Considered in detail, the city will compare favorably with any other of its size in the country. Its founders laid it out upon a generous plan, making the blocks ten acres in size, the lots 165 feet front by 330 feet in depth, and the streets 132 feet wide. No change has since occurred in the lines originally drawn except that the lots have been divided into smaller parcels, but all that human effort could do to make the city beautiful has been done. There are trees and lawns everywhere within its limits, and the city is threaded with over 100 miles of shaded brook-lined avenues. In the business portion the streets are paved with Utah asphaltum, and substantial cement walks lead through the residence portions. In 1890 the city entered upon a season of municipal improvements which included the construction of everything necessary to public health and comfort, and these improvements are still going on. Since their commencement a great system of sewers, with a gravity outlet five miles long, has been placed in operation, miles of sidewalks and street paving have been put down, a great public building, which cost over a million dollars and which is classed among the finest public structures in the West, has been constructed and completed, and many other similar advantages have been secured. The Rocky Mountain Bell Telephone Company, having headquarters in Salt Lake and controlling Idaho, Montana, Utah and Wyoming, maintains an extensive system. Over its 5,000 or more miles of wire communications may be had with 250 cities and towns in the four States. Connection was made in 1900 with the Pacific Coast cities and with Denver, and during 1901 Kansas City and the entire East will be on speaking terms with Zion. Salt Lake's population, as given by the census of 1900, is 53,531, but at the risk of criticism the statement is ventured that the figures are a decided underestimate. Checked by school attendance, directory publications, registration and polling lists, 65,000 would be nearer right. Tre governmental canvass was made during

the summer season, when thousands were absent in the prospecting fields and at pleasure resorts. The city now boasts of many fine business blocks, and these blocks, it is gratifying to note, ar all occupied and on a paying basis. Salt Lake's growth is not dependent entirely upon the East, although, of course, it receives every year an influx of population from distant States where either business or climatic conditions are unfavorable. Being in the center of a vast region wherein large operations are conducted in mining, stock-growing and other enterprises, and having a perfect climate, the Great Salt Lake, hot thermal springs, the lowest death rate of any city in the nation, good public schools, fine social conditions, beauty of location and environment and many other essentials of a perfect home place, it naturally attracts to it wealthy people from neighboring States who desire to give their families these advantages, and who arrange to carry on their enterprises from Salt Lake. So it is that while adverse national financial conditions have interfered with emigration to the West during the past few years, Salt Lake has been steadily growing. It is essentially the home city of the intermountain country. Every Utah miner who realizes his hopes invests his money here, and the city is filled with stately homes and business buildings which have been "dug" from the mines of this and adjoining States. As a a place for permanent homes no city in the West can compare with Salt Lake. The advantages it offers are legion. Property values are not exorbitant, the rate of taxation is moderate, almost every creed in Christendom has its church here, a perfect system of electric rapid transit permeates every portion of the city, the people are broad-minded, progressive and sociable, the laws are well-executed, crime is not common, and pauperism does not exist among those who are willing to work.

What the limits of Salt Lake's future are cannot be guessed, but that it will grow and expand with the certain growth and expansion of the great country around it cannot be questioned. While this account is being corrected (January, 1901) the building of a road from Salt Lake to Los Angeles is regarded as one of the certainties of the near future. This road will be to Salt Lake what the wonderful lamp was to Aladdin, and through its magic influence the city's future wealth and greatness will be secured. But there are other railroad movements in the air. At least two of the great Eastern lines threaten early building into Utah, and present indications are that Salt Lake is to become the center of interest to Western railroad builders. The large area given to Salt Lake by its founders is already occupied, and addition after addition has been added to the original limits. It is easier to assign a hundred reasons for the city's advancement than it is to offer one for its decadence.

The history of investment in Salt Lake real estate is replete with accounts of profits made, and the suggestion is offered that money conservatively invested now will certainly be returned many fold. Nothing can stop the progress of Salt Lake except the cessation of the progress of its great tributary country, and no one will contend that the development of the vast wealth of a region larger than all the Middle States is in danger of ceasing.

DEMAND FOR LABOR.

In justice to those resident in other States who are looking to Utah in search of employment, it is but fair to state that there is no unsatisfied demand for laborers or skilled employes. The farm labor of the State is largely supplied by the sons of land-owners and by those who, from long residence and experience, understand the peculiar methods employed in irrigation farming. Mining labor belongs to the skilled class, and those who have not had experience in the excavation of ores must not expect to secure employment readily. Of common day-laborers the State seems now to be well sup-

plied, and there is no dearth of bookkeepers, accountants, stenographers, clerks or others who follow similar vocations. To all who are looking this way for employment the advice is given, "Do not come expecting immediate work. Do not come at all unless you are sufficiently supplied with funds to tide you over the period of acquaintance and adjustment to local conditions which must precede the securing of work."

There is at present in Salt Lake no dearth of either skilled or unskilled laborers, or of stenographers, clerks and other similar employes. Persons seeking these and other kinds of employment cannot expect success until after they have passed through the period of acquaintance.

IMPORTANT FACTS.

The population of Utah is, according to the last census, 276,749.

Utah is within the arid region of the United States, and most entries of public land have been made under the provisions of the Desert Land Act, although some entries have been made under the pre-emption, homestead and timber culture acts.

There is but one land office, that at Salt Lake City, by writing to which information can be obtained as to how to take advantage of the Acts of Congress in location to public domain.

All crops common to the temperate zone are raised in Utah; but wheat, barley, rye, oats and lucerne are the leading products. Utah is not a corn country, although some is raised.

Of the fruits, apples, peaches, plums, cherries, pears, apricots; and of the small fruits, strawberries, blackberries, raspberries, gooseberries and currants are the leading products.

Nine-tenths of the farming is done by irrigation, water for which purpose is furnished from community ditches or from the ditches of organized irrigation companies at a nominal cost.

Utah's farm and fruit products are largely consumed in the State and surrounding States. The excess of potatoes and barley go as far east as Chicago.

Railroads make access to almost every part of the State easy, and round-trip rates are made between local points.

BRIEF INFORMATION.

The corner-stone of the Temple was laid April 6, 1853, by President Brigham Young, assisted by his counselors, Heber C. Kimball and Willard Richards. It was forty years under construction, and was dedicated April 6, 1893, by President Wilford Woodruff, assisted by his counselors, George Q. Cannon and Joseph F. Smith. This building is one of the most beautiful and massive in the United States, being constructed of gray granite obtained near the city. Its exterior dimensions are as follows: Length, 186½ feet; width, 99 feet. It is surmounted by six towers, three on the east and three on the west end of the structure. Other measurements may be summarized as follows: Height of central east spire, 221½ feet, upon which stands the golden figure of the angel Moroni, 12 feet 5½ inches high. The idea conveyed by the statue is that of a herald or messenger in the act of blowing a trumpet—an embodiment of the fact of Moroni bringing the gospel to the earth in this latter-day dispensation. This figure, by the famous Utah sculptor, Dallin, is of hammered copper, is gilded with pure gold-leaf, and surmounting its crown is an immense incandescent lamp of 100 candle-power. Height of west towers, 219 feet; height of east side towers, 200 feet; height of west side towers, 194 feet; thickness of foundation wall, 16 feet; thickness of wall at the bottom, 9 feet; thickness of wall at the top, 6 feet. This building is estimated to have

cost about $4,000,000. It is not open to the public, nor is it used as a place for general worship. Within it the different rites of the priesthood and the ceremonies of marriage and baptism are celebrated. Its interior decorations and furnishings are said to be the most magnificent of any building in the United States.

The great Tabernacle is 250 feet long, 150 feet wide and 100 feet high in the center of the roof, which is a single mighty arch unsupported by pillar or post, and is said to have but one counterpart on the globe. The walls are twelve feet thick, and there are twenty huge double doors for entry and exit. The Tabernacle resembles in appearance the back of a vast terrapin, or half of a prodigious egg cut in two lengthwise. This building seats 13,462 people, and its acoustic properties are so marvelous that a faint whisper or the dropping of a pin can be heard all over it. The Tabernacle is used as a meeting-house, and there every Sunday afternoon the Mormon people gather for religious worship. Within this building stands the famous Mormon organ, for many years the largest organ in the United States, and now the most sweet-toned. Around this organ assembles every Sunday the famous Mormon choir, the largest organized church choir in the world.

To the tourist interesting places to visit are Temple Square, Brigham Young Monument, the tithing yard, the Lion House, Bee Hive House, Amelia's Palace (former houses of Brigham Young), the Eagle Gate, Brigham Young's grave, the Salt Lake Theater (built in 1868), the Deseret Museum, the county and city buildings (cost $1,000,000), Saltair and Garfield bathing resorts on the Great Salt Lake, Fort Douglas, four miles east of the city, and the warm and hot springs at the city's northern limit.

Street-car lines reach all points of interest. The ride to Fort Douglas, where a fine view of the city, valley and lake can be had, is a pleasant one. Southbound cars afford a look at the perfection of agricultural development in the Salt Lake Valley.

The great Tabernacle is open to visitors, and an attendant will illustrate its marvelous acoustic properties upon request. Free organ recitals are here given on Wednesdays and Saturdays.

The great organ is world-famed for its sweetness of tone.

Visitors are not admitted to the Temple.

Saltair Beach has the largest bathing pavilion in the world. It rests upon piles 4,000 feet from shore.

You cannnot sink in the Great Salt Lake. The water is about one-fifth salt. A quarter of a million people bathe in the lake every year. Round-trip fare to all resorts, twenty-five cents; baths, twenty-five cents additional. Distance of lake from city, eleven miles. Hourly trains are run during the summer season on the Oregon Short Line and Salt Lake & Los Angeles railways.

Altitude Salt Lake City, 4,260 feet.

Average summer temperature, 72 degrees; average winter temperature, 32 degrees.

The death rate of Salt Lake for 1900 was 9.77 per thousand of population.

The area of Salt Lake is sixteen square miles.

Of churches Salt Lake has one of about every creed.

Salt Lake's school population for 1900 was 12,584; number of school buildings, 24, valued at $1,098,451.85; State school population, 84,419.

The tax rate for all purposes is about twenty-eight mills per dollar of valuation, which is about one-third full.

An appropriation has passed Congress for a $500,000 Federal Building, work upon which will begin on a site lately agreed upon and near the business center early in 1901.

The climate of the State varying with its varying altitudes, being coldest in Cache County and warmest in Washington County, but at no point are more than moderate extremes common.

Consumption does not orginate in Utah, and the climate is among the best in the world for the cure of that disease and for the relief of general throat and lung troubles. This is said to be due to the anomaly of sea air 4,000 feet above tide-water.

Distant from the larger towns, in productive valleys, good land under irrigation can be obtained from $10 to $100 per acre. Values increase materially if the lands are close to large centers of population. Several large irrigation companies of the State are offering land under their ditches at reasonable prices and upon good terms. Persons seeking farms are recommended to apply to them for information or to the land agent of the Union Pacific at Salt Lake City.

The laws of Utah have been very largely copied from those of other States, and will be found to afford ample protection to property and persons.

Women are qualified voters at all elections in Utah.

WRITE TO_____

B. A. McALLASTER,
LAND COMMISSIONER, U. P. R. R. CO.,
OMAHA, NEB.

For Maps and Prices of

FARMS, RANCHES, GRAZING LANDS For Sale by

Union Pacific Railroad Company

In Kansas, Nebraska,
Colorado,
Wyoming, Utah.

Prices:

FARMS, $4.00 TO $10.00 PER ACRE.
RANCHES, $1.50 TO $5.00 PER ACRE.
GRAZING LANDS, .50 TO $1.50 PER ACRE.

New Terms of Sale of Union Pacific Lands.

TEN YEARS' CREDIT.

One tenth of the purchase money is payable at time of purchase. At the end of the first year interest only, at the rate of six per cent per annum on the deferred purchase money, is payable. At the end of the second year, and each year thereafter, one-tenth of the purchase money becomes due, together with interest on the deferred amount at the rate of six per cent per annum.

Contracts may be paid up in full at any time before maturity, and interest will be charged only to date of final payment.

Five per cent discount will be allowed upon the unpaid, unmatured installments of principal which have more than nine months to run, where final payment is made upon a contract within five years after its date.

Ten per cent discount will be allowed from list prices upon cash sales.

INFORMATION

REGARDING

THE TERRITORY TRAVERSED BY THE UNION PACIFIC, TICKETS, BAGGAGE, PULLMAN OR TOURIST SLEEPING CAR BERTHS, MAPS, TIME TABLES, ETC., WILL BE CHEERFULLY FURNISHED ON APPLICATION TO ANY REPRESENTATIVE OF THE UNION PACIFIC PASSENGER DEPARTMENT AT THE AGENCIES NAMED BELOW.

ALBANY, N. Y.	23 Maiden Lane
BOSTON, MASS.	176 Washington Street
BUFFALO, N. Y.	301 Main Street
CHEYENNE, WYO.	Union Pacific Depot
CHICAGO, ILL.	193 South Clark Street
CINCINNATI, OHIO	407 Walnut Street
CLEVELAND, OHIO	211-212 Williamson Block
COLUMBUS, OHIO	358 North High Street
COUNCIL BLUFFS, IOWA	Union Pacific Transfer
DENVER, COLO.	941 Seventeenth Street
DES MOINES, IOWA	401 Walnut Street
DETROIT, MICH.	67 Woodward Avenue
INDIANAPOLIS, IND.	7 Jackson Place
KANSAS CITY, MO.	1000 Main Street
LEAVENWORTH, KAN.	228 Delaware Street
LINCOLN, NEB.	1044 O Street
LONDON, ENG.	122 Paul Mall
LOS ANGELES, CAL.	250 South Spring Street
NEW YORK CITY	287 Broadway
OAKLAND, CAL.	1160 Broadway
OGDEN, UTAH	Union Depot
OMAHA, NEB.	1324 Farnam Street
PHILADELPHIA, PA.	802 Chestnut Street
PITTSBURG, PA.	Park Building
PORTLAND, ORE.	135 Third Street
ST. JOSEPH, MO.	Board of Trade Building
ST. LOUIS, MO.	903 Olive Street, Century Building
ST. PAUL, MINN.	376 Robert Street
SALT LAKE CITY, UTAH	201 Main Street
SAN FRANCISCO, CAL.	1 Montgomery Street
SIOUX CITY, IOWA	603 Fourth Street
YOKOHAMA, JAPAN	4 Water Street

GERRIT FORT, A. G. P. A., OMAHA, NEB.

E. DICKINSON,
General Manager.

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General Passenger and Ticket Agent.

OMAHA, NEB.

UNION PACIFIC

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PASSING AS IT DOES THROUGH,
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EVERY BUSINESS INTEREST IS TO BE FOUND ALONG ITS LINE.

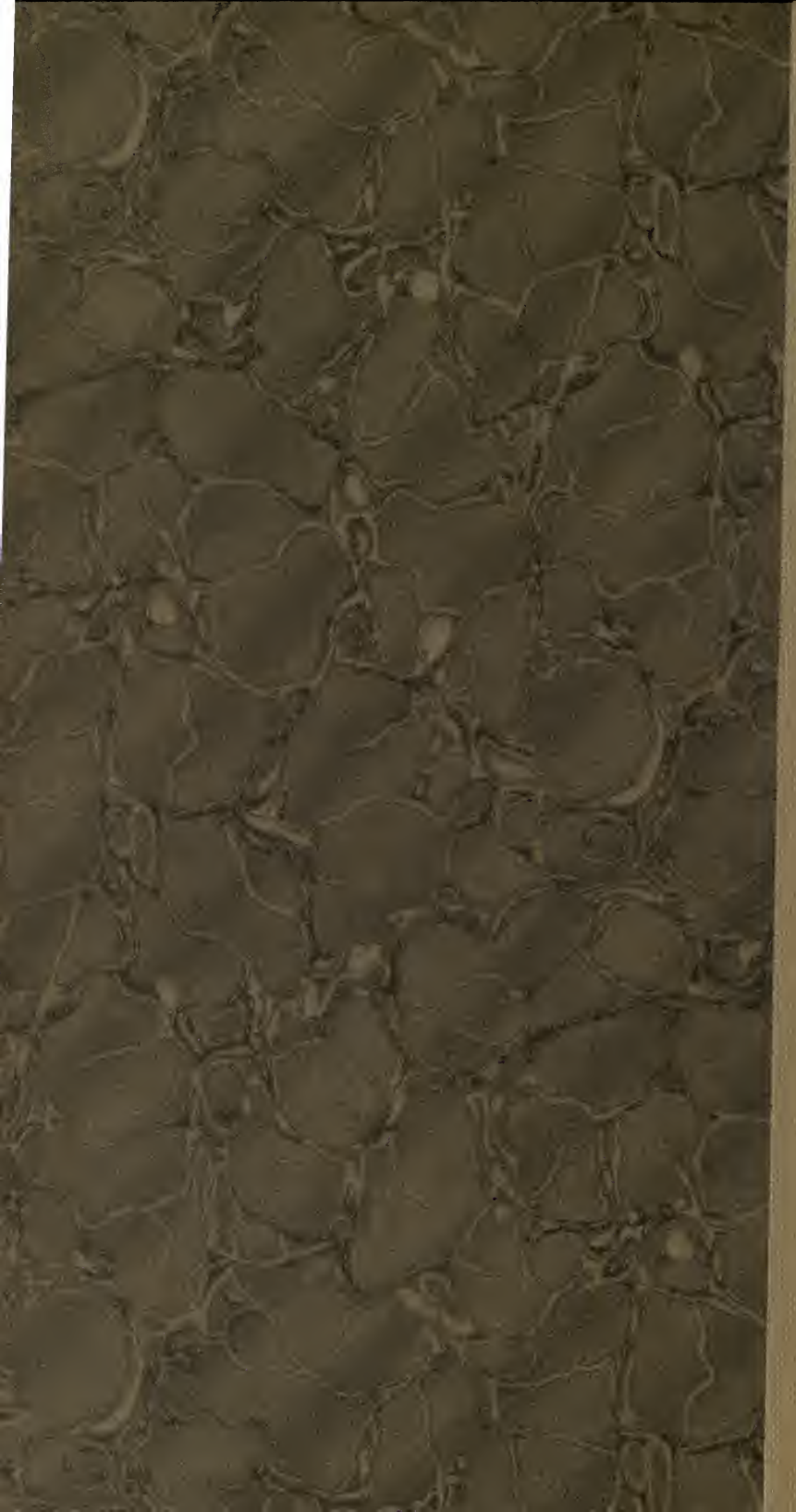
For the Farmer, thousands of acres of rich agricultural land are yet open for settlement.

For the Stock-Raiser, immense areas of excellent grazing lands can yet be secured.

For the Miner, the great mountains of the West wait but the opening to become the source of large fortunes, and

For the Business Man, the growing cities and towns of the West are daily offering unequalled opportunities for investment of capital and location of industries which are unsurpassed by older sections of the United States.

E. DICKINSON,
General Manager.

E. L. LOMAX,
General Passenger and Ticket Agent.

OMAHA, NEBRASKA.